Remarks ON OBSTETRIC SHOCK*

BY

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Although an alarming case, and especially a fatal case, of shock following a labour is a rare experience for any individual medical practitioner, a considerable number do occur throughout the country. This is established by the investigations which the Departmental Committee on Maternal Mortality and Morbidity has been able to carry out. Presumably a larger number are saved by suitable treatment at the cost of grave anxiety to the doctor in charge. After a careful study of such cases, especially of the predisposing conditions which play a great part in the causation of the shock, and also of the earliest signs of impending shock, I feel convinced that the subject is one well worthy of close attention.

In some cases of shock the cause may be at once obvious—for example, rupture or acute inversion of the uterus; in others, such as a prolonged and difficult forceps delivery, resulting in a severe laceration of the pelvic floor and followed perhaps by post-partum haemorrhage, it is not surprising to find the patient in a collapsed condition. But there is another type, more difficult to detect, in which the patient's condition is at first not alarming—no worse than one would expect considering that the labour had been rather long. "It was rather a tight fit"; there was somewhat more than the usual amount of bleeding, and she had needed stitches. She looks chilled, and the pulse rate is over a hundred; warm blankets and a rectal saline should put her right; they may, but in certain distressing cases the doctor is called back in two or three hours to find the patient desperately ill, and indeed she dies. The primary shock had not in itself given a warning of the impending and insidious secondary phase.

After all, obstetric shock is just the same thing as traumatic or surgical shock. It has the same causes, initiating and predisposing, and must be treated on the same principles. The distinction into primary and secondary phases must be ever in our minds in order that by recognition and prompt thorough treatment of the primary stage, the secondary—the fatal secondary—may be staved off. To anticipate my main conclusions: the blood pressure must be taken and used as a guide in all cases; the depleted plasma of the circulation must be replenished quickly and effectively by the most suitable fluid available, preferably by the injection of gum saline solution intravenously, though intravenous or even subcutaneous normal saline will always do good even if of short duration—it may keep the patient going until more effective fluids are available.

PRIMARY AND SECONDARY SHOCK

It is here necessary to give a short description of the modern conception of traumatic shock. My account is largely based on Cannon's work on the subject.¹ Clinical as well as experimental observations distinguish two stages—primary and secondary.

Early or primary shock is due to afferent impulses causing reflex vaso-dilatation and a consequent marked fall of blood pressure. For long it was thought that the blood vessels of the abdominal viscera were chiefly involved, but it is now recognized that it is in the

reflexly dilated capillaries of the skeletal muscles that the blood is dammed up—for the time being, lost to the circulation. The consequent diminished blood supply to the brain will result in faintness and even in loss of consciousness.

The capacity of the dilated capillaries of the voluntary muscles must be enormous. Professor Krogh² of Copenhagen, the recognized authority on the subject, states that the capillaries of a man's muscles put end to end would measure 100,000 kilometres, or two and a half times round the globe; their total surface would extend to 6,300 square metres, which I believe is about an acre and a half.

This is no doubt the true explanation of both obstetric and surgical shock, but in the obstetric cases there is also another factor in the more or less sudden lowering of the intra-abdominal blood pressure which follows the emptying of the uterus. In fact, this alone would seem sufficient to explain the phenomena so commonly seen after delivery—the faintness for which we withdraw the pillow beneath the patient's head, the shivering bout, which is probably a reflex from the skin deprived of its full supply of blood. The famous experiments on rabbits strongly support this supposition. A hutch rabbit held up by its ears will die because its disused flabby abdominal muscles cannot support the abdominal blood vessels. The wild rabbit so treated is unaffected; so is the hutch rabbit with a tight binder around its abdomen. Acting on this theory, I always insist on a tight abdominal binder being used as soon after the delivery as possible. In fact, it is only in the first few hours that a binder is of any use at all. With prompt and adequate treatment recovery will gradually take place from this primary shock; otherwise it may merge into the succeeding phase.

Delayed or secondary shock may set in after a latent period, during which nothing obviously abnormal may be noted unless a routine blood pressure reading has been taken. (In the obstetric case it is the downward tendency of the systolic blood pressure which gives the first premonitory warning of impending shock.)

Experiments—especially those of Cannon of Harvard University, in which the effect of crushing the skeletal muscles of animals has been studied—strongly suggest that traumatic shock is caused by some poisonous substance which is liberated from the damaged tissues and causes widespread relaxation of the capillaries. This takes some little time to develop, though it began in twenty minutes in some of the experiments and was well marked in half an hour. Its effect, of course, is to add to the stagnation of blood in the already dilated capillaries of the muscles. The poisonous substance liberated is either histamine or something closely allied and resembling it in action. It is present in all tissues and is readily liberated as a result of even trivial injuries. Besides causing dilatation of the capillaries, the toxic body, whatever its exact nature, also increases the permeability of the capillary walls, and so produces a reduction of blood volume by escape of plasma into the tissues. The amount of blood plasma circulating to the other parts of the body, particularly to the vital centres of the brain, is gravely diminished; this is the essential feature in the modern conception of shock.

The experimental evidence of this toxic explanation of secondary shock was strongly supported by clinical observations during the war. A French surgeon, Professor Quénu of Paris, demonstrated that extensive wounds of muscles were particularly apt to cause profound shock; he also established the view that anything which favours absorption at the region of injury is favourable to the development of shock, and that shock is most severe when the region of damage communicates with the exterior by only a small opening.

By applying these observations to obstetric practice I would venture to suggest that the unexpected secondary

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phase of obstetric shock may be due to extensive lacerations of the large muscles of the pelvic floor, the levatores ani, especially when such injuries are not accompanied by deep tears of the perineal body and vagina sufficient to expose the lacerated muscles. There is much clinical evidence for such a view. Routine early or late post-natal examination not seldom detects grave damage of the large pelvic floor muscles. The gynaecologist in operating for genital prolapse obtains ocular demonstration of these injuries. During delivery of the head with forceps probably all obstetricians have felt at one time or another "something give way" before or even without any serious tear of the perineal body. (This possibility might be investigated by those making post-mortem examinations in cases of obstetric shock.)

SIGNS OF SHOCK

In marked cases the patient lies very still, as if felled, paying no attention to what is going on around her. Anxiety has changed to mental dullness. The skin and mucous membranes are cold, grey, or cyanotic. The pulse is almost imperceptible, and, as a rule, very rapid. Respiration is shallow and quickened, the temperature subnormal, and the arterial blood pressure is low, perhaps unrecordable. The condition must be contrasted with that produced by haemorrhage alone. Here the patient is mentally alert and acutely anxious, tossing about or struggling to sit up as she gasps for air.

CAUSATION

From the point of view of treatment, and especially of preventive treatment, it is necessary to elaborate the question of causation. Besides the essential initiating causes produced by the original trauma—the primary reflex vaso-dilatation and the secondary toxic poisoning—there are other predisposing conditions or complicating factors. These are all present in varying degrees in the obstetric case. Without attempting to give them in order of importance, they are:

1. Bodily fatigue from prolonged muscular exertion.
2. Cold from exposure.
3. Deprivation of food and water.
4. Sweating.
5. Haemorrhage.
6. Anaesthetics.
7. Toxaemia of pregnancy.
8. Infection.
9. Emotion.

Of these I wish at the moment to draw particular attention to two only.

Haemorrhage

This is often a considerable factor, yet of itself it does not give rise to a prolonged permanent fall of blood pressure unless more than 25 per cent. of the body blood is lost. (A woman of 10 stone possesses about eight pints of blood.) Combined with injury it naturally aggravates shock, and therefore every effort must be made to prevent further loss of blood.

Anaesthesia

The type of general anaesthetic used is of prime importance. H. H. Dale³ has shown experimentally that both chloroform and ether, but not nitrous oxide with oxygen, sensitize the capillaries to the action of histamine, so that in unanaesthetized animals about ten times the dose of the drug is needed to produce a depression of blood pressure equivalent to that in the animal anaesthetized by chloroform or by ether. This has been confirmed by other observers, and Cannon himself says:

"The explanation of the difference between nitrous oxide and oxygen on the one hand, and such anaesthetics as ether and chloroform on the other, in their effects on the blood

pressure in shock, has not been fully accounted for. The practical matter, however, is that the patient in shock may be anaesthetized with nitrous oxide and oxygen and suffer no appreciable drop in blood pressure, whereas with ether or chloroform the drop is likely to be considerable and possibly highly dangerous."

Consideration of the other predisposing or complicating factors may be most usefully left to the section on preventive treatment. Cannon lays great stress on sustaining factors which result from the shock itself. These are the lowered metabolism resulting from the fall of blood pressure, the diminished heat production, the defective oxygen supply of all the tissues and of the nervous tissues in particular, and the damage to the walls of the capillaries. He says:

"These injuries to the elements which are essential to the maintenance of an efficient circulation, continue the state of shock which has been originated by other factors and may lower still further the already low arterial pressure."

A series of vicious circles is set up which lead to a depression of the circulation so profound that it cannot be restored, and the patient dies.

TREATMENT OF SHOCK

It is therefore of great importance that the treatment of the original condition should be prompt and adequate. Any further loss of blood must be prevented as far as possible. Body heat must be restored by the means most easily available, care being taken to avoid overheating and consequent sweating. In the less severe cases hot drinks are by far the best method of warming, as all the heat passes to the body itself. Pain, anxiety, and restlessness should be relieved by the injection of morphine, which should be given in an amount sufficient to make the patient quiet and comfortable.

In secondary shock, where blood is not stagnating in the large veins, there is no benefit to be gained by raising the foot of the bed. In the primary condition, however, particularly in obstetric cases with the special tendency to lowering of the intra-abdominal pressure, raising the foot of the bed will almost certainly improve the blood supply to the brain.

Above all, every precaution must be taken to avoid the development of secondary shock. This essentially consists in taking measures to raise the blood pressure. It is of the greatest importance to remember that it is often only by recording the blood pressure⁴ that the attendant is brought to realize the seriousness of the state of the patient, the great care that must be taken to prevent further exposure to the conditions which produce shock, and the necessity of employing really effective methods of increasing the volume of blood in circulation.

With the systolic pressure below 100 no operative treatment should be carried out, unless it is absolutely necessary in order to stop the loss of blood. Even then, the only safe anaesthetic to use, as we have already seen, is nitrous oxide and oxygen. Most certainly neither chloroform nor ether should be given for any operative treatment which is not essential at the moment. Here I particularly refer to the suturing of the torn perineum. The dictum "immediate repair of all tears" should always be qualified by excluding the cases in which the patient is shocked. Want of appreciation of this danger is a definite cause of maternal deaths. There is really no urgent necessity to suture immediately a perineal wound. Just as good a result can be obtained by repairing it a few hours later, when the patient has recovered from the shock. Indeed, often a better result can be assured, for time is given to provide assistance, good light, etc. Again, it is sometimes better surgical practice to leave the wound open. I refer to those cases (potentially infected, and often the very cases in which shock is pronounced) where

the labour has been greatly prolonged, in circumstances in which there is considerable liability to bacterial infection. Twenty years ago⁵ I produced evidence to show the grave danger to life caused by replacing the inverted uterus when the patient is in a condition of shock. Since then I have come to realize that even the repair of a torn perineum may take away the patient's chance of recovery.

Restoration of Volume of Blood Plasma

All the above procedures are easily carried out. The most important measure, however—namely, that necessary to increase the amount of fluid in the circulation—requires forethought and gives more trouble. Every obstetrician should always be provided with the simple apparatus needed to give at least a subcutaneous saline. Ideally he ought to be prepared to give an intravenous infusion of saline or other more effective fluid. For well-known reasons gum saline solution is definitely more beneficial—more lasting in its effects, especially in the more severe cases—than simple saline. It is nowadays so carefully prepared and conveniently put up by the big chemical firms that there is no excuse for not having it at hand. Warned to a little above body temperature, it must be injected slowly, at low pressure, into the vein (the more profound and prolonged the shock, the more slowly; in one's anxiety this is not an easy rule to remember). About 500 to 750 c.cm. (a pint more or less) is enough for a first injection; but another may have to be given. To ensure safety forty to sixty minutes are required for this procedure.

A blood transfusion is even more effective, especially in cases of severe haemorrhage; in modern hospitals this can usually be carried out within an hour or two. But while waiting for the blood—and this is a point which I particularly wish to emphasize—precious time must not be wasted. The simpler means at hand must be employed. It must not be forgotten that many a life was saved by simple saline solution long before blood transfusion was in vogue. All experienced surgeons can testify to the value of normal saline infusion, especially in cases of haemorrhage.⁶ In studying reports of fatal obstetric cases from all over the country, one is dismally impressed by the repeated statement that blood transfusion was considered necessary but was not available, and yet in many of these cases either no attempt at all was made to give any form of fluid, or nothing more than a rectal saline was used. It is very doubtful if this is absorbed at all, or at least rapidly enough, in any but slight cases of shock. A pint or two of normal saline into the large cellular space of the axilla may suffice to restore a mild case, or maintain the serious one until blood is available.

PREVENTION OF SHOCK

This is a much more satisfying procedure for everyone concerned. I have already given a list of predisposing causes, and it will be easiest to indicate the precautions required under those headings.

Bodily Fatigue from Prolonged Muscular Exertion

The amount of muscular exertion involved in labour is, of course, very variable. It should not impose too great a strain on the woman who, by virtue of proper ante-natal management, is in good physical and mental condition at the onset of labour. This essentially involves care in diet, daily exercise, and sound sleep at night. Special attention should be paid to the last point at the end of the pregnancy; if necessary a sleeping draught should be given. During the actual labour, if it be at all prolonged, the necessity for sleep, or at least oblivion to the passage of time, is of still greater importance. The prevention of undue prolongation of the labour requires

fine obstetrical discrimination. It is unkind to mother and child to allow the second stage to be unnecessarily protracted—the head in an occipito-posterior position, for instance, pounding on the rigid perineum hour after hour. But it is dangerous to both mother and child, especially from the point of view of shock, to shorten, or to endeavour to shorten, the labour by the premature use of forceps. This misuse of a valuable instrument is too common a cause of the condition we are considering, especially in the primigravida. Extensive trauma is often the result.

Now the stress in labour is much more on the nervous than on the muscular system of the patient; this must be our guide in seeking to give relief to the actual pain and mental strain. More and more the modern woman demands this relief. What is the best means? Some years ago I read a paper to this society on this question, largely in praise of chloral hydrate, a most valuable drug in some cases of delay from inertia. But for the relief of actual pain I have been entirely converted in the last eighteen months to the use of scopolamine, without any morphine, in the large doses recommended by Dr. David Jennings.⁷ When the pains begin to distress the patient, whether in the first or second stage of labour, one-hundredth of a grain is given; the dose is repeated in half an hour, and again at the end of the next half-hour if it be required. After that the same dose is given at about two-hourly intervals. In most cases only one, two, or three doses are necessary, but I have known as many as six to be given in the course of ten hours. In my experience no harmful effects have occurred; uterine contractions are certainly not diminished by it, as they may be with morphine. I have never seen the somnolent baby that used to bother me occasionally when morphine was given with small doses of scopolamine. The feeling of well-being, mental and physical, has long been recognized after "twilight sleep." It is most striking after these larger doses. But it is as a preventive of obstetric shock that this method of scopolamine treatment appeals to me.

For some two years the blood pressure, during and after labour, has been recorded in my private cases, and in an increasing number of cases at the Jessop Hospital for Women. The senior resident officers, Mr. Alan Fawcett, and, during the last twelve months, Dr. E. ap I. Rosser, have put themselves to much trouble to make these observations, and I am greatly indebted to them. I have no doubt that the recording of blood pressure will soon be generally recognized as a routine requirement. It has been carried out in all cases at the Jessop Hospital during the last nine months. Sisters in the labour ward can be trained to take reliable readings.

On studying the blood pressure records, taken during the various stages of labour and immediately after, in scores of cases during the last fifteen months, I have been greatly impressed by the fact that the fall of blood pressure has been less when scopolamine is used. In fact, in many cases there is no fall at all, and when anaesthesia is induced during the actual delivery by means of nitrous oxide and oxygen, we have records of even a rise in the systolic pressure. This combination of scopolamine analgesia and gas anaesthesia is the most beneficial advance in the management of labour which I have witnessed. Other drugs are being tested, such as avertin and amytal, but of their value I have no experience. I believe that the solution of the problem of relief of pain in labour will be found in the use of such drugs as scopolamine, rather than in the widespread administration of general anaesthetics such as chloroform.

Cold from Exposure.—As a rule, precautions have been taken to eliminate this factor by proper warming of the room. However, I can recall several instances in which

I have found an emergency case chilled to the marrow in an ice-cold bedroom. In one Derbyshire farmhouse it took two hours to warm up a patient sufficiently to warrant her removal by ambulance. There is also the unavoidable exposure during instrumental delivery and perineal repair. A perineal cloth is some protection, and for years I have always taken a thick pair of stockings, such as are used in operating theatres, to emergency confinements.

Deprivation of Food and Water.—In addition to the usual fluid diet, the free drinking of glucose solution (one pound to a quart of water) is helpful; it is better than the heavily sugared tea with which we plied our district patients in my student days.

Haemorrhage.—To prevent undue loss of blood is a fundamental rule of midwifery. But the average pregnant woman can stand and quickly recover from a haemorrhage considerably more severe than that seen in normal labour. Everyone has observed this time and again. There is just the danger that such experiences may lead to a forgetfulness of the extra care required to control the loss of blood in those cases in which other factors predisposing to shock are present. I need only refer to the necessity for additional care in managing the third stage of labour in cases of placenta praevia. There is grave danger in allowing a trickle of blood to continue during that stage. One must remember that the placenta is already separated to some extent: it must be expressed or removed should a trickle commence.

The prophylactic use of normal saline, gum saline, or even blood transfusion during the course of labour in cases of ante-partum haemorrhage is of great importance in preventing the onset of shock which is so apt to occur after the delivery. Pituitary extract is useful in diminishing the loss of blood by its action on the uterine muscle, and by virtue of its pressor factor it helps to maintain or even raise the systolic blood pressure. In recent years pituitary extract has been standardized, and purified, by washing with alcohol, whereby the "histamine"-like impurity, a product of protein decomposition, has been removed. The danger of overdosage, with consequent syncope due to spasm of the coronary arteries, has thus been greatly lessened, and the risk of actually injecting "histamine" is eliminated. I have seen nothing but good result from the injection of five to ten units of the modern preparation in such cases as we are now considering.

General Anaesthesia.—I have already referred to the grave danger caused by the use of chloroform or ether in the presence of shock. Prolonged use of either of these drugs in labour predisposes to the onset of shock. This applies particularly to chloroform, and especially to the repeated use of chloroform in those obstetric cases—not so very uncommon—in which an anaesthetic is required on two or more occasions during a labour—for example, for the induction of labour, or for a thorough examination in the earlier stages, and later on for the actual delivery or for repair of lacerations. Chloroform is a very useful and convenient drug in midwifery, but it should be used chiefly to relieve the pain caused by the actual birth of the child.

Ether can be given with greater safety for more prolonged periods, but both drugs definitely diminish the activity of the uterine muscle and tend to lower the blood pressure. In all these respects they are greatly inferior to nitrous oxide and oxygen, which, properly given, is not toxic and does not in the slightest degree lessen uterine activity; it often appears to intensify it. Its value is so great that I strongly hold that all maternity hospitals should be provided with an efficient apparatus for its administration. It is nowhere seen to greater advantage than in those cases of "failed forceps" which often show

considerable shock on admission to hospital, from trauma and either exposure to prolonged chloroform or the absence of any anaesthetic at all. Annual reports of maternity hospitals nearly always record the death from shock of one or more of these patients. I believe many of them could be saved by the use of gas and oxygen when an anaesthetic is required. McKesson's smaller apparatus, specially devised for obstetric work, is wonderfully efficient and conveniently portable.

Toxaemia.—The woman suffering from toxaemia of pregnancy, especially the nephritic type, is markedly susceptible to the influences which favour shock. Induction of labour must therefore not be delayed if the toxic state is increasing. Methods of delivery involving the least trauma must be chosen. Chloroform should never be given, and ether is not much less harmful. Gas and oxygen is again the best anaesthetic. Glucose should be given by the mouth or even intravenously in severe cases.

Infection will add to the tissue poisons causing shock. It may occur during a prolonged labour, and, if suspected, it is advisable to leave open any perineal or vaginal wound, applying to it a sterile saline or glycerin dressing.

Emotion

This is a factor which is not often predominant, though it may well play a part more often than we realize. In analysing the causes of twenty-six maternal deaths which occurred in 9,468 deliveries (giving the low rate of 2.7 per 1,000) at the Royal Free Hospital, Dame Louise McIlroy^{*} attributed six deaths to obstetric shock and four to shock from haemorrhage. She expressed the opinion that "fear, anxiety, and intense suffering during labour are predisposing factors, and that haemorrhage is not always sufficient to account for the collapse, and sometimes death, which occurs after a long painful labour."

We have already considered the use of drugs to relieve fear and anxiety, and to prevent intense suffering, but we must also remember the necessity of recognizing and protecting those patients who are unusually susceptible to emotional shock—by no means an easy matter. Perhaps I can best help by giving three examples. The first is taken from the Bible.*

"And his daughter in law, Phinehas' wife, was with child, near to be delivered: and when she heard the tidings that the ark of God was taken, and that her father in law and her husband were dead, she bowed herself and travailed; for her pains came upon her."

"And about the time of her death the women that stood by her said unto her, Fear not; for thou hast born a son. But she answered not, neither did she regard it."

All tidings should not be conveyed to a woman in labour. When a stillbirth occurs it is wise to induce, by means of morphine, a long sleep before the mother is told of her misfortune. Whitridge Williams, in his splendid textbook *Obstetrics*, records a case of emotional collapse, which I transcribe in full. In the section on sudden death during or after labour and under the heading "Profound mental depression" he tells this story.

"In rare instances the only apparent explanation for death, or for a profound collapse which eventuates in recovery, is to be found in the mental condition of the patient, since the most careful examination, both at the bedside and at autopsy, may fail to reveal the slightest abnormality."

"I recall a case in my own practice which apparently belongs in this category. The patient, who was unhappily married, had already passed through two difficult labours. When I saw her, in the latter part of the first stage of her third labour, she was about the room. Just before going to bed at the beginning of the second stage she asked the nurse and me to witness her will, as she said she felt sure she would not survive. The labour was rapid and uneventful, the placenta coming away spontaneously. An hour later, on approaching the bed to take leave of the patient, I was struck with her haggard appearance. Fearing the possibility of

* 1 Samuel, iv, 19, 20.

concealed haemorrhage, I at once applied my hand over the uterus and found it tightly contracted, while the pulse was of excellent quality. Without any apparent reason, and in spite of energetic stimulation, the patient grew slowly worse, the pulse becoming rapid and weak, the eyes sinking back in their sockets, and the face assuming a drawn and Hippocratic expression.

"Thorough examination failed to reveal the slightest cause for the condition. The hand introduced into the uterus could find no trace of rupture. Eight hours after delivery I requested a colleague to see her in consultation, but he also was unable to offer any explanation. It then occurred to me that the condition might possibly be the result of her morbid forebodings, and acting upon that supposition I administered a large dose of morphine hypodermically, which was promptly followed by sound sleep, a marked improvement in the character of the pulse, and some rapid change for the better in the general appearance. Upon awakening a few hours later the patient felt very comfortable and made an uninterrupted recovery."

From my own experience I can record a case which had a tragic ending. These are my notes.

M. W., aged 29, primipara. On April 25th, 1925, attended by her family doctor, a careful and experienced obstetrician. I was called in after the second stage of labour as the patient had collapsed. Labour, expected on the 27th, started on the 22nd. Poor pains, on the 23rd and 24th, were treated with morphine, hyoscine, and chloral. The membranes ruptured on the 25th at 9 a.m. The cervix was then fully dilated and quite effaced. At 11 a.m. 1/2 c.cm. of pituitrin was given. The feeble contractions increased slightly, but were not efficient. About 12 o'clock low forceps were applied under light chloroform anaesthesia induced by the doctor himself. The pelvic floor was very rigid, and twenty minutes were occupied in extracting the child. The patient collapsed very shortly afterwards. There was no haemorrhage, and only a slight tear of the perineal body. As there was no obvious cause for the collapse, and as the placenta had not come away, the doctor explored the vagina and cervix with his hand. He could feel that the placenta was still in the uterus, but, the patient's condition being very serious, he considered it unwise and probably unnecessary to remove it. He sent for assistance and started a submammary infusion of saline.

I arrived at 1 p.m., less than an hour after the delivery. The patient was then very pale, pulseless at the wrist, but not at all restless. The uterus was as high as the umbilicus, not relaxed, but contracting only slightly and at long intervals. There was no bleeding. She was at once given 1/2 c.cm. of omnopon, and glucose was added to the saline. She rallied slowly. By 4 p.m. her colour had returned, and the pulse was countable at the wrist—120, very small. At 7 p.m. the pulse was still 120, still very small, and the patient was sleeping. The condition of the uterus was unchanged. At 10 p.m. the doctor injected ergotamine hypodermically, as a "safeguard" for the night.

I saw her again the next morning at 11 o'clock; she had had a restless night and had passed two very small clots, without pain. The temperature was 98.4° F.; it had been up to 99° F. Her condition was much better. Her colour had returned and she talked freely. There was no abdominal pain nor rigidity. The uterus was unchanged. Before considering the question of removal of the placenta, we decided to move the patient into hospital (her mother had been taken to hospital for removal of adherent placenta after the patient's own birth). The patient readily agreed, but while talking quite cheerfully about the necessary arrangements her face suddenly set, her eyes stared (we thought a fit was impending), and she died in two minutes or less. Traction on the tongue, artificial respiration, strychnine injected hypodermically and into the heart, all failed to revive her.

Afterwards I inspected the vagina and cervix, but found only a moderate tear of the perineal body. I passed my hand into the uterus, but found no rupture. The placenta peeled off with no unusual difficulty. The uterine wall was thin and relaxed. There was no sensation of free fluid in the pouch of Douglas. The ultimate diagnosis was death from emotional shock.

The patient was of gipsy type, very deeply pigmented, and she was said by her father to be of a very emotional temperament. I have seen the statement made that darkly pigmented people are specially vulnerable to shock, whether physical or

mental. Unfortunately no record of the blood pressure was taken, and no post-mortem examination of the pelvic floor muscles was made. It is noteworthy that the pelvic floor was described as being very rigid.

The exact cause of death in these cases is not known. Possibly direct cardiac inhibition occurs, but it has been shown experimentally by Cannon¹ and others that mental emotion will stimulate the suprarenal gland to excessive secretion. Now although adrenaline causes a prolonged vaso-constriction in skin vessels, it also produces "an increase in the volume of blood present in voluntary muscle and in the intestine." This has been demonstrated by Dr. G. A. Clark¹⁰ in the physiological department of Sheffield University. We have seen that in traumatic shock the capillaries of muscles are relaxed. The effect of adrenaline either injected into or secreted by a patient already or recently the subject of traumatic shock, will therefore be harmful and possibly even fatal.

In the fatal case just described the placenta was retained. The relationship of shock to retention of the placenta is not quite clear. Personally I prefer the view that it is the shock which paralyses the uterus and causes retention of the placenta to that which holds that the adherent placenta promotes shock. Hence I agree that no attempt should be made to remove the placenta while the shock persists, unless, of course, partial separation leads to haemorrhage.

Finally, we are left with the prevention of emotional shock. This is too wide a subject to deal with here. It is perhaps best summed up in careful and considerate ante-natal care whereby the woman is helped to approach her confinement with a mind freed from anxiety and apprehension.

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CEREBRAL CORTICAL STRUCTURE AND ITS RELATIONS TO MENTAL DISEASE

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It seems reasonably safe to assume that the average medical man has little or no knowledge of the intricacies of the histological construction of the brain, now technically known as cyto-architectonics, or of the significance and practical utility of these developments in general and special practice. Yet English law may compel every medical man to certify, when necessary, cases of mental deficiency and mental disease; and the most recent Act of all implies a hope that more cures may be effected than heretofore. The profession is thus at a double disadvantage; and so it may be helpful if some brief account be given, as simply as possible, of recent advances in the study of brain structure and its relationship to mental disorder.