THE
DUBLIN JOURNAL OF
MEDICAL SCIENCE

THE OFFICIAL ORGAN OF THE ROYAL ACADEMY
OF MEDICINE IN IRELAND

FOURTH SERIES. No. 24. FEBRUARY, 1922

Original Communications.

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“HÆMORRHAGIC SHOCK”; ITS
CAUSE, AND INFLUENCE ON
PREGNANCY.*

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THE researches of Cannon, Bayliss, Wallace, Dale, Delbet, and Quenu have established the fact that a poison generated in injured muscle is capable, when absorbed, of producing profound shock. Dale remarks that these observers concentrated their attention upon muscle, but that it is not singular in its power of developing toxin, for bile and intestinal contents are highly active in this respect.

Now that our attention has been drawn to the subject obstetricians will have no difficulty in establishing the fact that freshly effused blood is also similarly toxic.

A woman swallows blood and is thereby profoundly collapsed, relief only coming after the stomach is emptied.

A patient suffering from ruptured tubal pregnancy is on the point of death with a loss of blood not comparable to that which is lost in many a normal child-birth.

Concealed accidental hæmorrhage with its comparatively

*Read before the Section of Obstetrics, Royal Academy of Medicine in Ireland, December 2, 1921.

small effusion is only diagnosed because of the terrible collapse it induces.

I have seen extreme shock accompany the formation of a hæmatoma of the vulva, and in a recent experience where a blood effusion collected beneath the skin of a fresh abdominal scar, the collapse became so profound that my junior Resident Staff felt themselves compelled to administer horse-serum, calcium, morphia, stimulants and the other prized remedies of the Pharmacopœia. It was not until a few clips were loosened and a clot about the size of a closed hand was removed, that the condition improved ; an iodoform gauze plug stopped further oozing.

It is needless to labour this point further, for the facts are patent to all observers, nor is there any other reasonable explanation to account for the conditions above cited.

Clearly, too, it is in freshly effused blood that the poison arises, for when clot forms, the condition becomes comparatively harmless. Thus we account for the formation of an hæmatocele. Its presence is proof that the woman has rallied from her initial shock.

In discussing the causation of shock it seems to me that little attention has been paid to one of its earliest and most marked characteristics, namely, the almost universal relaxation of the unstriated and, I think, of the striped muscles as well. In no other way can I account for the exaggerated inflation and drawing in of the cheeks during respiration in extreme shock. The pupils open, the anus relaxes, the intestines dilate, the bladder expands, and I believe it will be found that the veins are also affected. Dale and his co-workers have not been able to discover congestion of the large abdominal veins, and he by a process of elimination arrives at the conclusion that the blood which has, in a large measure, left the heart, the arteries and the veins, must stagnate in the capillaries.

At a later stage the vessel walls become pervious and permit the escape of plasma, thereby in all probability adding a further toxic element. This, however, does not account for emptiness of the vessels during the earlier periods of shock. Increase in the calibre of all the veins as well as the capillaries would quite well account for this,

and would also explain the absence of engorgement in the abdominal veins, for their increased capacity would make them appear comparatively empty, in spite of their containing an amount of blood not much less than their normal supply.

The heart, which might be expected to retract on its diminished contents, appears on the contrary to dilate or, at all events, to become dilatable ; many positive observations have demonstrated this fact, for instance, when saline infusion has been passed too rapidly into a vein.

Saline leaves the vessels almost as quickly as it enters them, and it is inconceivable that a healthy heart could not withstand the strain.

The functions of the arterial muscles is to regulate pressure, and it might therefore be expected that they would be less easily diverted from this function than structures less highly specialized, and this is what seems to occur, for, at first, the arteries contract. The bounding heart, comparable to a clock without its pendulum, can rarely drive a pulse wave to the wrist, and thus its abnormal slowness can be accounted for. Finally, the arteries, too, dilate, and the pulse, now as rapid as the heart-beat, becomes abnormally compressible and more and more difficult to feel until it finally disappears completely.

If elongation of muscle is a condition of shock it should be present to a marked degree in the uterus ; this certainly is so in many instances, though I am not prepared to say in all. I have not observed the phenomena where the abdomen has been opened for the cure of tubal rupture. I have, however, never directed any attention to the matter, and have seized the uterus as a preliminary manœuvre, thereby effectually masking dilation did it exist. I know from personal observation that the lumina of both tubes are much enlarged in the portions far removed from the implanted ovum, and I think the uterus appears from within the abdomen to be larger than it feels by bimanual examination.

I shall now give concrete examples of uterine dilatation.

Many years ago Sir Andrew Horne and I were summoned to help a practitioner who had become unnerved during the

removal of an adherent placenta. Whilst completing the operation, I found the uterus greatly enlarged with flaccid walls, and thin as wash-leather. All hæmorrhage had ceased, but the woman was suffering from profound shock and died an hour after the extraction.

Again in 1907 I performed a Cæsarean section before the onset of labour on a woman whom I considered healthy. I quote from the Rotunda Report. "The uterus, on being opened, displayed an almost bloodless condition, and the placenta was so firmly adherent that its removal was accomplished with the greatest difficulty.

"During this manipulation the atonic uterus lay flabby and thin-walled without showing the slightest indication of retracting and thickening. Hæmorrhage was very slight, and we proceeded to stitch the uterus without the least foreboding of disaster. Suddenly the anæsthetist announced that respiration had ceased, and the operation had at once to be interrupted whilst successful means were adopted to revive the patient. The pulse, however, remained quite imperceptible, and was never felt again. though death did not take place until three hours after the completion of the operation.

"It may be remembered that in 1905-6 I commented on three labour deaths due, in my opinion, to obstetrical shock apart from severe hæmorrhage. In these cases the uterus was found flabby and dilated. This condition is frequently the accompaniment of adherent placenta, and the dilated condition of the uterus precedes rather than follows the general shock. We consider this case one of the same class."

Here, then, is the record of a condition written fourteen years ago and whilst the tragedy was fresh in my memory. I could only record, not explain.

Another well-known observation may be cited. A uterus which has retracted after child-birth again fills with blood and does so until its fundus once more reaches the ensiform cartilage, contractions then occur which expel the contents, or the blood is expressed by the examiner's hand. A sudden outpouring occurs, followed by immediate and severe shock, symptoms which follow rather than precede the uterine

enlargement. This enlargement has occurred, not as the result of internal pressure, as is proved by the ease with which expulsion takes place. Further, it is not loss of blood which has caused the shock, for the blood has left the vessels before shock intervenes. Clearly both enlargement of the uterus and shock are due to absorption of poison products.

In considering the mechanism of muscle elongation a new physiological truth becomes evident, for here we have fibres lengthening beyond their normal limit without the intervention of any pulling or pushing force, and there can be no air pressure in the opened uterus of a Cæsarean section. Again, it is a common experience to see the anus dilate before direct pressure is exercised upon it by the presenting foetal head.

Morley Roberts, and other writers have insisted on the power of a muscle to relax to its normal limit by its own positive force, but I know of no previous observations which suggest the possibility of a muscle in similar manner actually exceeding in length its normal limits or, in other words, undergoing a process the reverse of retraction.

The powers to contract and retract are known properties of muscle, the former a temporary shortening of its fibres is under the control of nerve impulse, the latter is an inherent property uninfluenced by nerve stimulus. It limits the normal range within which a fibre moves, and certainly, as regards the uterus, the muscle will tear rather than stretch if subjected to overwhelming strain.

Again, retraction is quite independent of contraction, and usually takes place when the muscle appears soft and inert. Were this not so a woman would die of hæmorrhage were Cæsarean section performed before labour had started, for then the uterus is always inert. She does not bleed because the uterus retracts and can be seen doing so during the progress of the operation.

We must believe that a reversed process takes place in the growth of a pregnant uterus, one not due to pressure from within, for the walls, save when contracting, are not in tension.

If then slow reversed action is admitted, there is no

inherent difficulty in believing in an accelerated movement rapid as retraction itself.

Let it also be noticed that contractions are not interfered with by this over-stretching, therefore the arteries contracted in shock are probably in a condition of "retraction reversed."

Much that was formerly obscure is made clear by this concept, and we need no longer hold or teach the very improbable view that concealed accidental hæmorrhage arises as the result of an atonic and enfeebled uterus, such a uterus could never mature a full term fœtus, for sterility, abortion or rupture would occur as its inevitable result.

Accidental hæmorrhage is due to either toxæmia or direct violence, and the fact that only 30% of such cases show albuminuria does not militate against the strength of this view, for many toxic conditions are unaccompanied by albumin.

If the blood fails to escape quickly, absorption of its poisonous products is followed by shock and dilatation of the uterus, while the plug, by holding back blood, may increase the severity of the symptoms.

We also see the reason why the operation of Cæsarean section, as practised by Sir William Smyly and myself, is preferable to that of hysterectomy, for the shock is less and the dreaded hæmorrhage is a proved myth.

Hysterectomy with its 50% mortality is based on the supposition of a rotten unretracting uterus.

Again the usual classification of post-partum hæmorrhages is misleading. Years ago I wrote that atonic hæmorrhage was the rarest of rare calamities, for when it was supposed to occur we almost invariably found some mechanical obstruction which prevented the uterus retracting. I now know that it does not exist, for inertia is no bar to retraction. In the rare instances in which I thought I observed it we were really dealing with the "reversed retraction" of shock.

What then becomes of the teaching which condemns forceps as a means of delivery in the presence of uterine inertia? Much unnecessary suffering and harm have resulted as a consequence. It is shock and not inertia that is to be dreaded. Every uterus is inert when Cæsarean

section is performed before labour starts, yet bleeding is not profuse and the muscle can be seen thickening up in spite of its apparent flabbiness.

The views here expressed, if true, should be accepted, and if accepted, must effect great changes in our thought and practice. This will upset many cherished beliefs and render obsolete our newest text-books.

I trust, therefore, that the subject will receive careful consideration. Further facts and logical deductions are most desirable either in proof or disproof of what I have written, but unsupported expressions of opinion or prejudice, such as “I think,” “I hold,” “I believe,” “I feel confident,” are not helpful in the elucidation of this nor of any other scientific problem.