due in the middle of March. Her blood pressure was 168, and she was treated with veratrine. She had two more fits, but after more veratrine her blood pressure went down to 80, and they ceased. Her urine contained 4 grains of albumin per ounce, and she passed 6 oz. At 10 a.m. next day the patient went into labour, and at 11.30 was given morphine gr. $\frac{1}{2}$, hyoscine gr. $\frac{1}{15}$; the os admitted one finger, and the pains were strong. Her blood pressure was taken every half-hour and veratrine given when it was high. The injections of hyoscine were given every hour; after the third injection her memory was gone, and she was sleeping. The injections were continued, and the baby was born at 11.30 p.m. with forceps without chloroform (to bring the head over the perineum). The baby cried at once. The veratrine was continued during the labour to keep the blood pressure low. The mother and child both did very well, and left hospital twenty days later.

CASE II.

Mrs. M., aged 31, 1-para. Admitted 11.45 p.m., March 14th. Os the size of a shilling; pains strong. At 1 a.m. on March 15th, morphine gr. $\frac{1}{2}$, hyoscine gr. $\frac{1}{15}$; the hyoscine was repeated in gr. $\frac{1}{15}$ doses every hour. The patient slept; she said she felt pains a little, and at 2.30 p.m. became more awake. Morphine gr. $\frac{1}{2}$ was given at 2.30 p.m. The hyoscine was continued every three-quarters of an hour. These were continued all the next day, March 16th; the patient was sleeping most of the time, and when asked if she felt any pain, she complained of a sore shoulder and wandered in her talk. At 9 p.m. on March 16th, the head appeared to have stuck, so forceps were applied. The os had been fully dilated for some hours, but the patient had been left to see if the child would be born spontaneously; for the fetal heart sounded good, and the patient's condition likewise. As the patient was slightly restless, chloroform was given. It was a firm pull, and there was a slight tear. The baby was born at 9.45 p.m., March 16th, and cried at once. Next day the patient could remember nothing except the pain she had when she came into hospital. She had quite lost count of the days, and did not know what day it was. The total number of injections in the case was one morphine gr. $\frac{1}{2}$, hyoscine gr. $\frac{1}{15}$, one morphine gr. $\frac{1}{2}$; forty-three injections of hyoscine gr. $\frac{1}{15}$. This was the greatest number given.

During the labour she had drinks of water and was catheterized. She appeared very fit the next day after the labour, and the child was very well.

CASE III.

Mrs. A., 1-para, aged 26. Admitted February 18th. On February 18th the pains were very strong and regular, and the os admitted two fingers. Morphine gr. $\frac{1}{2}$ and hyoscine gr. $\frac{1}{15}$ was injected. In half an hour the patient was sleeping, the hyoscine was injected after an hour. She was very congested about the face, and complained of great thirst. She was sleeping between the pains, but awoke during them. At the end of three hours from the first injection (she had had two of hyoscine and her memory had gone) she began to get a little restless during the pains. The injections were continued, but the restlessness got worse. She became obstreperous, tearing her hair, throwing herself about, and trying to bite the nurses. She had to be held in bed. However, she did exactly as she was told at the time—namely, when told to lie down she did so, but the restlessness soon started again. It was decided to stop the injections. Her memory was still gone, but it was difficult to apply the test. Two hours later she was much quieter and delivery was quite normal. She had eight injections. She slept for six hours, and then she felt quite all right. She could not remember anything about the restlessness, but just remembered the baby being born. The baby cried at once.

SUMMARY OF PROCEDURE.

The following is a summary of special points which are most important:

1. In the case of a primipara the first injection must not be given too early, as it tends to stop the pains. The rule of giving the first injection when the os admits two fingers, and the pains are regular, is a useful one. In the case of a multipara, however, the injections cannot be given too early after the pains have started. It is generally found that the first injection is given too late.

2. The second injection, namely, the first $\frac{1}{15}$ gr. of pure hyoscine, should be given about an hour after the initial injection, whether the patient is well under or not. If this injection is delayed the effect of the morphine tends to wear off, when the future injections of hyoscine will not take effect.

3. The injection can with safety be repeated either at hourly or three-quarter hourly intervals.

4. Do not repeat the morphine in the latter part of the second stage or the child will most probably be born oligopnoeic. If the hyoscine is not taking effect, then it is well to give the mother a slight whiff of chloroform; thus the hyoscine is allowed to work and the patient gets again into the condition of "twilight sleep."

5. The patient's friends must be kept away from the room, which ought to be quiet and darkened.

C

6. Patients, if thirsty, must be given water to drink.

7. The bladder must be catheterized during long labours.

8. Remove the baby to another room after birth, so that the mother cannot hear the cries, otherwise she may remember the cry and so piece together, and so imagine her whole labour.

CONCLUSIONS.

From the foregoing experience it may be stated that we have a safe and efficient means of managing labour painlessly in the majority of cases. It requires, however, the constant attendance of a competent attendant. This rôle can be efficiently undertaken by a reliable nurse under supervision, which makes its adoption in better class private practice possible to the medical practitioner.

It is of special value in primiparae, in whom as a rule the first and second stages of labour are long and painful.

It is also of great value in a prolonged second stage, due to a large head or slightly contracted pelvis, as it allows of head moulding without unduly exhausting the patient.

So far as amnesia is concerned, it is of little use to commence the treatment during the second stage.

The strength of the uterine contractions is not diminished, hence its advantage over chloroform. There are no contraindications to its use beyond extreme restlessness, which is very exceptional, and probably due to an idiosyncrasy.

The absence of exhaustion after even a long labour is one of its greatest advantages.

Thirty-seven of the forty patients rose from bed on the third day after labour.

It is regrettable that such a great deal of publicity has been given to the subject, and that prominent specialists have allowed themselves to be exploited through the lay press, as the lay community suffers from the want of knowledge and sense of proportion which allows of an estimate of its value under various conditions, and is therefore too apt to attempt to force the hand of the careful practitioner. At the same time, the method of management of labour is so good from the point of view of relief of suffering, that it may help materially to bring about the increase of the birth-rate so much required, which is perhaps the only argument in favour of publication in lay journals, etc.

REFERENCES TO LITERATURE.

- Hanna Rion: *Painless Childbirth in Twilight Sleep*.
Kronig: *BRITISH MEDICAL JOURNAL*, September 19th, 1908.
Giuseppe: *Practitioner*, July, 1911.
Buist: *BRITISH MEDICAL JOURNAL*, September 19th, 1908.
Croom: *Journ. Obstet. and Gyn. of the British Empire*, vol. xvi, 1909.
Croom: *Edin. Med. Journ.*, August, 1915.
Hellman: *Twilight Sleep*, H. K. Lewis and Co., 1915.

RETRACTION OF THE UTERINE MUSCLE ASSOCIATED WITH OBSTRUCTED LABOUR.

BY

H. T. HICKS, F.R.C.S.,

GYNÆCOLOGICAL SURGEON, DERBYSHIRE ROYAL INFIRMARY.

IN 1906 I reported two cases of premature retraction of the uterus occurring in primiparous patients. In both cases the brim of the pelvis was contracted moderately, and in one there was some oblique distortion. In neither case was the bony obstruction of the pelvis too great to prevent delivery with forceps or with the cephalotribe after perforation of the fetal skull. Since then I have seen two more cases:

My reason for again bringing the subject forward is because I know that this condition is not often recognized and that I have altered my own views in the light of further experience.

In order to make the condition clear I will give one case in detail.

A primipara, aged 30, rather short in the long bones and square about the head, went into labour at full term on June 27th, at 10 p.m. She was seen by the doctor next morning; he found the os about the size of half a crown (about 3 cm.). The fetal head was high above the brim and freely movable. The head seemed half extended. The diagonal conjugate was taken and measured $4\frac{1}{2}$ in. The cervix hung loosely below the presenting part. By 8.40 p.m. on June 28th the os was apparently fully dilated, but still not filled by the presenting part. The doctor came to the conclusion that there was enough room to allow of an easy delivery with forceps. The membranes had

been ruptured a few hours before; forceps were applied with ease, but moderate traction failed to bring the fetal head down into the brim. About 11 p.m. forceps were again applied, but without result. The patient seemed quite well, and as the uterine contractions had slackened off, the doctor decided to wait till the morning, hoping that the fetal head might be driven and moulded into the brim. Forceps were again applied on the morning of June 29th, but without any result.

I saw the patient early in the afternoon, about forty hours after the onset of labour. I measured the pelvic cavity digitally, and found that the sacral promontory was high up and the diagonal conjugate $4\frac{1}{2}$ in. The ilio-pectineal lines seemed massive and narrowing the transverse diameter. The external measurements, taken afterwards, were of no practical value. Thus this was a rickety, flat, generally contracted pelvis, the contraction being only moderate. The cervix was fully dilated, but was hanging down unfilled by the presenting part, and was very oedematous. The fetal head was of normal size. It was lying above the brim, and could be made to flex or extend at will. It could also be rotated around a vertical axis. On passing my hand above the mobile fetal head, a thick band of uterine muscle was found to have formed round the neck of the child. Two fingers were passed along the neck of the child above the limit of the band; the clavicle and arms of the fetus could be reached. The condition was clear—the uterus had gone into tonic contraction while the head of the child was still high above the brim. The neck of the child was therefore above the lower limit of the retractile and contractile muscle. The retractile uterine muscle had moulded itself to the fetal neck, forming a firm muscular ring, while the thinned out lower zone contained the mobile fetal head.

As the patient lived on a farm twenty-two miles away from the hospital, I thought it would do no harm to make one attempt to pull the shoulders through the muscular ring. She was put deeply under chloroform, and after perforating the fetal skull and applying traction with the cephalotribe it was obvious that the fetus and uterus had become one welded mass. Traction merely brought the whole mass down, and when released there was an elastic recoil to the original position. I removed the fetus by Caesarean section, but the patient, who was in a cyanosed and collapsed condition, died next day.

In all these cases there is some form of contraction or distortion at the pelvic brim. The fetal head does not engage and remains high above the brim, and is very mobile. The uterus continues to contract and retract. The membranes rupture early and the cervix hangs down unfilled by the presenting part. At some time after the membranes rupture the uterine muscle passes into a state of tetany, and since the neck of the fetus is high above the brim, it lies within the retractile zone of the uterine muscle. A firm mass of muscle forms round the neck of the fetus and grips it, so that the shoulders can neither pass through nor can the fetal head rise. The uterine cavity has therefore become hourglass in shape. The upper cavity contains the trunk and the lower the head. As retraction progresses the uterus moulds itself to the fetal trunk and neck, while the lower zone becomes progressively thinner. This condition may come on a few hours after the rupture of the membranes, and when once established constitutes one of the most terrible complications met with in obstetric surgery.

In a great number of moderately contracted pelvises the fetal head settles in the brim. Here is a very different situation. In dealing with such cases it is only necessary to overcome the mechanical obstruction, for the neck of the fetus lies within the lower zone of the uterus. Thus if early retraction of the uterus takes place, its lower limit is above the shoulder of the fetus. Delivery with forceps or cephalotribe can be effected according to circumstances. When the fetal head is high up and the retraction ring has formed round its neck, no amount of traction will be of any use, because the trouble now lies above at the retraction ring. The shoulders cannot pass below this ring, and the whole mass—uterus and fetus—becomes as it were welded together.

Some of the cases are admitted with a leg and the head presenting. This tells its own tale. Version has been attempted, and a leg brought down, but the fetal head cannot rise, so matters are only made worse, and if delivery is attempted the uterus will be ruptured. These poor cyanosed patients are admitted into hospital in a state of exhaustion, and with the vagina hopelessly lacerated. For hours they have been under an anaesthetic; delivery has been attempted with forceps, cephalotripsy, and even by version.

This condition is ill described in textbooks, and is not recognized by many obstetric surgeons themselves. If a practitioner has missed an obviously contracted pelvis and has spent the whole night with his colleagues attempting to deliver a fetal head through an impossible pelvis, then

blame him as much as possible. The cases here described come under a different heading, and they present great difficulties both in diagnosis and in treatment. In order to save the child a very early diagnosis is necessary, while any great delay endangers the mother's life.

Diagnosis and Treatment.

The patients are all primiparae. They are either the subjects of infantile rickets or have some deformity, such as old disease of the hip-joint. Let us suppose that the patient is at full term and labour has just begun. The abdomen may be pendulous and the fetal head felt just above the brim. The measurements of the pelvis are taken. If there is great deformity, say a diagonal conjugate of $3\frac{1}{2}$ in. or less, the mechanical obstruction is so obvious that steps would be taken to meet it. In all the cases I have seen the mechanical obstruction has not been very great.

In the second case, published in the *Lancet*, "Mr. Targett's case," May 12th, 1906, the measurements of the pelvis were taken clinically, and I measured the bony pelvis after removing it at the *post-mortem* examination. The actual measurements from bony points were:

Interspinous diameter	...	...	...	...	8½ inches.
Intercristal diameter	...	...	...	...	9½ "
Posterior interspinous	...	...	...	...	3½ "
True conjugate...	...	...	...	...	4 "
Right oblique	...	...	...	...	4½ "
Left oblique	...	...	...	...	4½ "
Transverse	...	...	...	...	5 "

In fact, a woman who is an obvious dwarf or has a hopeless pelvis is in a far more safe position than one who has less pelvic contraction, especially if there is oblique distortion at the brim of the pelvis. Let us premise that the pelvis is only moderately contracted, and the doctor estimates that he can deliver with forceps if necessary. The presenting part is a vertex and lies high above the brim. It seems flexed or it may be half extended. Labour is allowed to proceed. The uterine contractions are strong and the os dilates, but is never filled by anything except the membranes. These rupture early and the cervix hangs down and becomes oedematous. It feels dilatable, but is not completely dilated. The uterine contractions continue, but after a while there seems to be no attempt at bearing down, and the patient complains of a continuous uneasiness about the abdomen. The fetal head is still above the brim. It seems to become more mobile, because the lower zone is thinning out, and when the uterus contracts it seems to be lifted higher up. If the examining hand be passed above the head the retracting ring will be found. Just about this time forceps are applied, and if the real state of affairs is not at once recognized, disaster will follow.

The position of the fetal head is perhaps the most important point. Before labour sets in it is high above the brim, while in a primiparous woman it should be right down in the pelvic cavity.

As the first stage of labour proceeds the head still remains high up, and as labour still progresses it becomes more mobile and will even ascend. At first, then, the fetal head cannot enter the pelvic brim because of the bony obstruction, but later this becomes of secondary importance because a retraction ring has formed around the fetal neck. It is this ring which is the cause of failure to deliver by mechanical traction from below. No amount of traction will bring the shoulders of the fetus through this retracting barrier of uterine muscle. The ring will hold even with the patient at the point of death.

With regard to the treatment, it is clear that an early diagnosis is all-important. One cannot too much emphasize the fact that a high and mobile fetal head occurring in a primiparous woman means trouble. It is a simple indication of trouble, but one often neglected. If the practitioner thinks there is room enough to allow of forceps delivery, and the fetal head is high above the brim and movable, the patient may be placed deeply under chloroform and morphine. If moderate traction fails to bring the head into the pelvic cavity, and if, when the traction is released, there is an elastic recoil of the fetus and uterus, no further attempt should be made. Caesarean section is the only safe means of delivery, making it even possible to save the child as well as the mother. It is absolutely wrong to persist in any further attempt at delivery from below.

While performing Caesarean section on one of these cases, which, unhappily, was only a last desperate attempt

to save the mother, I had great difficulty in extracting the fetal head from the lower thinned-out uterine cavity. The retraction ring held firmly, although the patient was deeply under morphine and chloroform. It was also interesting to note at the time of the operation that, although there was a firm band of uterine muscle around the neck of the fetus, there was no sign of this externally. I opened the upper cavity of the hourglass and caught a leg. I had to deliver the fetal head, which was below the muscular bar, by jaw traction. I mention this fact because it shows the persistence of the muscular tetany in a collapsed patient under both morphine and chloroform.

It will be noticed that I have made no reference to text-books or papers. I wish only to give a clear clinical account of a condition which I know occurs time after time without being recognized. Many practitioners may go thirty years without seeing a case of this kind, or never see one at all.

In one of the latest books on obstetrics this condition is lightly touched upon. The author states that it is due to (1) the administration of ergot, or (2) to spasm, caused by repeated attempts at delivery. He recommends the administration of morphine gr. $\frac{1}{2}$, deep anaesthesia, and appropriate means to overcome the obstruction.

I have never seen any cases in the early stages of labour, but from the careful accounts given by the doctors in charge I feel sure that the retracting barrier had already formed when forceps were first applied. Again, the measurements of the brim in each case had been taken, and if the real trouble had been simply a mechanical obstruction at this point, the fetal head could have been delivered either with forceps or with the cephalotribe. I have seen a patient who had been more or less under deep anaesthesia and morphine for ten hours, yet the retracting uterine muscle still gripped the neck of the fetus. None of the cases had been given ergot. Of the four cases I have seen, only one recovered. Two died within a few hours of delivery, while the last died suddenly of pulmonary embolism on the fourth day of the puerperium. In my former paper I suggested that decapitation with delivery of the fetal head, followed by version, was a means of effecting delivery, but in the light of further experience I am now convinced that Caesarean section is the safest and best method of treatment. The earlier this is done the better.

CONCLUSIONS.

I would make the following suggestions:

1. Be on your guard when dealing with a short, thick-set woman with a square head and short long bones.
2. A high position of the fetal head, occurring in a primipara, should at once denote serious trouble.
3. Measure the diameters of the pelvis, but do not place too much store upon your estimate. The brim may be obliquely distorted, and this will prevent the head from entering the brim and at the same time will not show up in your calculations.
4. Cut-and-dried rules on pelvimetry are useful only in severe contractions of the pelvis.
5. Remember that to apply forceps to a fetal head which is movable and high above the brim is an obstetric operation requiring the most careful consideration, and should only be undertaken after careful examination of the condition of the uterine muscle around the neck of the fetus. If the examining hand can be passed easily beyond the shoulders of the fetus, an attempt at delivery with instruments may be made. If there is the least evidence that the uterine muscle is retracting round the neck of the fetus, Caesarean section should at once be performed.
6. When once the retraction ring has formed around the neck of the fetus, it will grip it firmly until the patient is almost at the point of death.

P.S.—Since writing this short paper I have seen another case. In spite of much bruising and laceration of the vagina an earlier diagnosis rendered it possible to save both mother and child by Caesarean section.

WE are glad to learn that Professor Kocher of Berne has recovered from a severe attack of double pneumonia and pleurisy which he experienced in the spring and is resuming his work as professor of surgery. His recovery, at the age of 75, from so severe an illness is evidence of the vigour of his constitution and will be a source of great gratification to his many friends in this country.

BREATHLESSNESS IN SOLDIERS SUFFERING FROM IRRITABLE HEART.

BY

THOMAS LEWIS, M.D., CAPTAIN COTTON, C.A.M.C.,
J. BARCROFT, F.R.S., T. R. MILROY,
D. DUFTON, AND T. R. PARSONS.

(From the Hampstead Military Hospital and the Physiological Laboratory, Cambridge.)

(Report to the Medical Research Committee.)

BREATHLESSNESS may arise from any one of a great number of causes, some of which, like mechanical impairment of the heart or lungs, are apparent, while others are more obscure. The immediate stimulus to the respiratory centre is in most cases a chemical one, so that the difference between the cases in which the cause of breathlessness is explicable and those in which it is obscure depends on whether there is an evident clue to a chemical change in the blood which may be transferred to the respiratory centre. Thus, in the commonest physiological type of breathlessness, that due to muscular exercise, carbonic and lactic acids are passed into the blood and stimulate the respiratory centre; in the case of patients recently gassed the want of sufficient functional lung surface dams back the carbonic acid in the blood and so produces breathlessness. More obscure, because the cause has to be sought directly in the blood itself, is the condition of acidosis, though this, in respect of its symptom of breathlessness, falls into the same group with that of the previous cases, since in all alike the exciting stimulus to the respiratory centre is a relatively acid condition of the blood.

The object of the present paper is to draw the attention, and especially, at the present time, of those charged with the care of military patients, to another and more subtle cause of breathlessness. The reason for our doing so is that we have found it to exist in five out of six cases in which the cause of the breathlessness present was so far in doubt as to make a systematic examination of the chemical properties of the blood desirable. The cause of breathlessness to which we refer is the absence of an adequate supply of "buffer" salts in the blood. The patients in which this condition is present are to be found amongst those who are diagnosed as having "irritable hearts" or "trench hearts," that is, among the number of soldiers invalided during the period of training or while on active service because they are unable to tolerate physical exercise. In these cases exertion produces some of the following symptoms—namely, excessive fatigue or actual exhaustion, attacks of giddiness or actual fainting, palpitation and pain usually situated in the precordial region. The patients to whom we refer show no constant physical signs, but in the majority of them the heart rate is abnormally high when the subjects are up and about. Moderate exercise increases the pulse-rate excessively. It is the rule to find high respiratory rate in these subjects while they are at rest, and in some cases this rate may be as high as 40 per minute.

Let us now turn to the consideration of "buffer" salts, and to some explanation of the part which they play in the pathology of the cases under consideration.

The blood is at all times receiving and parting with acid and alkali. These variations in constitution, if effected in an ordinary saline solution, would produce changes in relative acidity and alkalinity which would be physiologically intolerable; their effect on the brain alone would be to excite or depress its various centres to extreme limits. The respiratory centre, for instance, would be stimulated to violent dyspnoea by the acidity resulting from trivial exercise; it would be brought to a standstill by a moderate acquisition in alkali. A given addition of carbonic acid to the blood only produces a quarter of the change in reaction which it would produce in a corresponding quantity of physiological saline solution. Thus, if 100 c.cm. of blood be taken and the same quantity of normal salt solution, 1.3 c.cm. of carbonic acid dissolved in the saline would change its reaction to the same extent as 5 c.cm. would change that of the blood. The reason of this is that the blood contains such substances as sodium bicarbonate, monacid and diacid sodium phosphates, and