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# PRACTICAL OBSERVATIONS

ON

THE ADMINISTRATION AND EFFECTS

OF

# CHLOROFORM,

ESPECIALLY IN ITS APPLICATION IN CASES OF

NATURAL LABOUR.

BY

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Let it be remembered that the least part of knowledge passed to man by so large a charter from God, must be subject to that use for which God hath granted it, which is the benefit and relief of the state and society of man.

BACON.

LONDON: JOHN CHURCHILL, PRINCES STREET, SOHO;  
LEICESTER: J. S. CROSSLEY.

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1848.

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## PRACTICAL OBSERVATIONS

ON

## CHLOROFORM.

THE substance termed Chloroform now occupies such an important position in the list of remedies, and its effects bear so immediately upon the comfort of all those who are the subjects of pain, that the public generally have the greatest right to judge for themselves whether its administration be desirable or not ; and I trust they will credit me when I say that in my examination of its merits I have divested myself of all prejudice, and that the results at which I have arrived have been fairly deduced from a careful consideration of its chemical and physiological properties, and from an extended experience of its exhibition and effects under the most opposite conditions of the human frame.

Chloroform was first discovered by Dumas, but its application as an anæsthetic agent was first accomplished by Dr. Simpson of Edinburgh, who after trying it upon himself, administered it to several persons in December last.

Chloroform is a colourless liquid, of a peculiarly pungent yet agreeable smell, and a particularly sweet taste ; it is very heavy, having a specific gravity of 1.48, water being 1.00 ; it boils at 141° Fahrenheit, but it readily passes off into vapour at a much lower temperature : the vapour is very dense, its specific gravity being 4.2 ; and in this respect it differs from ether, the vapour of which has a specific gravity of 2.58. Chemically it consists of carbon, hydrogen, and chlorine ; and if a little chloroform be placed in a watch-glass and warmed that its vapour may rise quickly, a taper introduced therein is immediately extinguished, a slightly green tinge being communicated to the flame, and a most disagreeable odour arising from the decomposition of the chloroform. These chemical characteristics are of the utmost importance, and they will be further alluded to.

*Physiological effects.* Chloroform has been generally administered by the process of inhalation ; a certain quantity is placed either upon a sponge, handkerchief, or other inhaler, and the vapour being drawn into the lungs, is absorbed into the blood, where it appears to act simply by its presence first upon the brain, and secondly on the lungs and heart.

When thus exhibited, it produces an agreeable drowsiness, accompanied by more or less of consciousness ; an indescribable and not unpleasant tingling of the limbs, which after a short time lose their sensibility ; at last the patient sinks into a deep slumber of the most tranquil kind, and in this state

all consciousness both of pain and external circumstances is entirely suspended.

It is evident from the above description that there are two stages in the state induced : the one, in which consciousness being entire, the sensibility to pain is alone destroyed ; the other, in which all the senses are drowned in profound slumber. In the former, the patient undergoing an operation knows all that is going on around him, he hears and understands what is said, he knows when pain is likely to be inflicted upon him, yet is he unconscious of it when it approaches, or if he feels it, there is no proportion between the amount and severity of the pain when compared with that which might be expected from the exciting cause. It is this state which is the one most desirable to be maintained in all long-continued suffering as that which accompanies labour ; and it is this form which requires the greatest care and skill to sustain equally and successfully without danger to the patient.

The second, or more profound state, is that most generally employed in short but severe suffering, such as is caused by the removal of limbs, and other surgical operations ; and in those cases of midwifery where the active interference of the accoucheur is indispensably necessary, which being productive of such violent pain, renders such a state of unconsciousness highly desirable.

Many objections have been made to the use of chloroform, and especially against its exhibition for

the relief of the pain of natural labour. Many have objected to it on religious grounds, as being contrary to the ordination of the Almighty, who decreed concerning the female "that she should bring forth in sorrow." This objection has been most amply and learnedly discussed by Dr. Simpson, in a small pamphlet which I would recommend for the perusal of those who are not convinced by the following extracts. In the first place, Dr. Simpson observes, that even the curse upon the ground was not immutable, for God says of Israel, "Blessed is the fruit of thy body and the fruit of thy land;" and the Gospel dispensation is pre-eminently one of mercy, and not of judgment: it cannot be doubted therefore that the relief of pain is right, if God has in his merciful Providence directed the energy of man to so desirable a discovery. But further: if it be wrong to take away pain, it is also wrong to alleviate it, and the accoucheur has no right to mitigate the sufferings of his distracted patient even by a dose of opium. Lastly, Dr. Simpson proves most clearly, that the sorrow mentioned in the curse is in fact that necessary effort properly termed labour, without which the delivery cannot be accomplished, and which is characteristic of, and essential to, the act of human parturition; further, that the pangs or pain as of a woman in travail, described in the Psalms and other parts of Scripture, is expressed in the Hebrew by a very different term, proving that the removal of these pangs does not imply any evasion



of the terms of the curse, but only a mitigation of its severity. To these considerations I would add, that whilst numerous cases have been recorded in which delivery has been accomplished during natural sleep without consciousness of the act having occurred; so on the other hand there can never be a period when the pangs of labour shall cease to afflict the female, since it is not practicable to administer anæsthetics universally, nor indeed, in any one case, from the commencement to the termination of the parturient process; in fact it cannot be too strongly noted, that it is only when the labour has reached a certain stage that anæsthetics can be given with due advantage.

Another objection is urged against the state of anæsthesia; viz. that unconsciousness, or loss of mental power, also ensues. Dr. Ashwell has urged this objection in the following terms: "Supposing the case to be a fatal one, a circumstance which must occasionally happen, I would not envy the remorse which must follow the conviction, that by such an event the momentous arrangements of a dying hour have been entirely prevented." Much might be said upon this subject; but the question is at once answered by denying the production of entire unconsciousness: it is true that the senses are not in a most active condition in the first stage of anæsthesia, but the intermission of the chloroform will always restore them after a few minutes, and the danger is never so sudden and imminent but that it is antici-

pated by the medical attendant in full time for this restoration. But further, I may confidently appeal to all who may have witnessed so distressing an occurrence, and ask whether unconsciousness in *sudden death during delivery or immediately after* be not rather desirable than the contrary. The patient is surely not then in a condition to attend to the momentous question of salvation, for the powers of mind and body are convulsed by the suffering of the moment, and the most terrible restlessness only succeeds to the apathy and unconsciousness of rapid exhaustion.

A further objection is made against the exhibition of chloroform, on account of certain ill effects which result from its administration.

First, It is said to excoriate the mouth. When properly prepared and quite pure, chloroform is entirely free of this charge; but unless it is carefully tested and found devoid of alcohol, excoriation of the lips and inflammation of the lungs are very likely to happen. Every medical attendant is therefore responsible for the non-occurrence of these inconveniences.

Secondly, The most weighty objection to the use of chloroform occurs in the fact that death has been more than once caused by its exhibition. I do not wish to controvert this fact, since it is my firm conviction that several recorded deaths were really occasioned by it; but I shall endeavour to explain the manner in which death took place, and also to prove

that it is perfectly easy to administer chloroform without the least shadow of danger.

Now the examination after death has, in these cases, revealed those appearances which are usually produced by asphyxia, as observed in death by drowning, hanging, immersion in carbonic acid gas, &c. These appearances show that the blood has not undergone the usual process of restoration in the lungs, that it has accumulated in those organs, and that death has resulted first from the circulation of impure blood and the consequent inactivity of the brain and spinal cord, and secondly from the accumulation above noticed and the subsequent cessation of the heart's action.

Now it is not necessary to prevent the supply of air in order to produce asphyxia; the same effect will result if we mix up with the air breathed an agent which has a direct influence in preventing the absorption of oxygen, or, in other words, the process of respiration: further, we find that those agents which prevent combustion and extinguish flame have also a like effect upon the respiratory process; thus, if we add one measure of carbonic acid gas to four measures of atmospheric air, we obtain a mixture in which a candle will be extinguished, not from the absence of oxygen, for there is still present 16 per cent., but from the presence of a substance incapable of supporting combustion, which exerts a positive influence in preventing the process. The same mixture will, when breathed, produce asphyxia and death, from the same cause.

I have previously shown that the vapour of chloroform will as readily extinguish flame as carbonic acid gas; when, therefore, it is inhaled in too concentrated a form, it diminishes the percentage of oxygen in the inspired air, and it also exerts a positive influence in checking the absorption of the oxygen still present, either of which effects is capable of producing death by asphyxia.

But the ill effect of chloroform does not stop here, for Dr. Glover has proved "that it possesses a remarkable power of obstructing the pulmonic circulation when injected into the veins, or when introduced into the stomach," and this contributes to increase the danger of producing asphyxia by its incautious or excessive administration.

Now with a perfect knowledge of these serious sources of apprehension, we have to enquire, first, if it may yet be given with safety; and secondly, if any distinct landmarks may be pointed out by which these dangers may be certainly and successfully avoided.

The first question is answered generally by the fact, that of the many thousands of persons who have inhaled chloroform not more than two or three have died under its influence, which is more than can be said of any other important remedy, ether alone excepted; and now that its effects and mode of action are more understood, there is reason to believe that fatal consequences will be still more rare.

Secondly, Have we any landmarks which point

out the approach of danger? The first sensation experienced by a person labouring under asphyxia is a distressing feeling of suffocation; in all recorded cases of death from chloroform this sensation has been described; indeed its occurrence, and the disagreeable symptoms which usually accompany it, have not unfrequently been urged as unfavourable arguments. When in the exhibition of chloroform the quantity inhaled is sufficient to reduce the percentage of oxygen in the air contained in the lungs, and to prevent the respiratory changes, the patient experiences this sensation, the pulse becomes small and feeble, at the same time altered in velocity, the respiratory efforts become irregular, and of a gasping character, the blood being retained in the lungs accumulates there, the lips become pale, and fainting supervenes, from the brain not receiving its due supply of blood, and unless pure air be quickly re-admitted into the lungs and the circulation re-established, death ensues. The sensation of suffocation is therefore to be regarded as an evidence that asphyxia is beginning, and that the chloroform is being inhaled too rapidly; it points out most clearly that there is too little air in the lungs, and that it is necessary at once to remove the chloroform and give the patient the benefit of unmixed air, and if this be done at once there cannot be the least fear of danger. I therefore regard the sensation of suffocation as a landmark of danger, but when the chloroform is properly administered the patient will never have occasion to complain of this symptom.

But it may be objected that this is not a certain safeguard in all conditions : occasionally a patient not fully insensible to the pain she is suffering is over anxious to inhale a more copious dose ; in doing so she immediately becomes pallid, the pulse becomes quickened and the respiration heavy ; she is too insensible to be cognizant of the sense of suffocation, and the lungs become more and more congested. It is under these circumstances that chloroform is really dangerous, yet is this danger entirely obviated if the attention of the medical attendant be solely directed to its administration ; he then watches with care the character of each inspiration ; if it be deeper than usual, or if the air inspired be fully charged with chloroform, he removes the handkerchief and permits one or two inspirations of pure air ; if the pulse become quickened, or the lungs oppressed, or the insensibility unnecessarily deep, he acts in the same manner. The restoration of pure air affords the most speedy relief, and as in cases of hanging or drowning the persons easily recover if they have been asphyxiated only a short time, so do they now recover if the state have only lasted a few seconds. In the exhibition of chloroform I recommend that the quantity inspired should never be sufficient to induce cough, irritation, or the slightest unpleasant sensation, and if any such symptoms occur its exhibition should be suspended for a few seconds. In the advanced stage, where it is required to keep up its effect, the medical attendant can alone supply the

place of consciousness, and by his unremitting attention he must recognize the earliest approach to these serious indications. Entirely to prevent them he must be careful not to exhibit too large a dose at once, indeed I would recommend him never to allow the patient to breathe the vapour throughout an entire respiration; if the handkerchief be removed when half the inspiration is accomplished, the latter half will certainly secure a sufficiency of atmospheric air for the purposes of respiration. By observing these precautions I have repeatedly succeeded in administering chloroform to ladies of the most excitable temperament, and of delicate constitution, without hearing from them a single complaint; they have been kept under its influence for an hour to three hours respectively, without the least expression of pain or discomfort; and in one instance the patient was in the first stage of anæsthesia upwards of seven hours without any other effect than relief from most severe pain, which would otherwise have induced great depression of the vital power.

3. Another ill effect attributed to chloroform is increased frequency of the pulse. Whenever the lungs become engorged with blood, the heart endeavours by extraordinary exertion to remove the impediment to the circulation; this therefore is another effect of an overdose of the remedy. On Tuesday the 15th day of February I was called to attend Mrs. P. in her first confinement; she was 29 years of age, and of a particularly masculine form,

and I had every reason to apprehend a severe and lingering labour. I first saw her at 8 o'clock in the morning, but it was not until near 3 o'clock p.m. that the parturient process had advanced so far as to justify the exhibition of chloroform; the pains were then most excruciating, and the patient uttered loud cries of anguish at each recurrence. In order to test the influence of chloroform, I called upon my friend Mr. Harding, of the Infirmary, to request him to note the effect of its exhibition. In the first place it was noticed that the respirations were 30 in the minute, and the pulse 59, the latter being slightly accelerated during the paroxysm of pain; I then commenced the inhalation, and during the next pain the cries were less loud, though the effort was as long and as severe as before; I remarked that the full effect of the chloroform had not yet ensued. The next pain was unaccompanied by any expression of pain, though the usual effort continued to be made. Mr. Harding then informed me that the pulse had remained stationary during the interval, but during the pain it had increased one beat per minute, subsiding however to her former standard as the pain abated. The respiration had suffered no variation from its former state. The exhibition of the chloroform was continued without intermission for an hour and a half, during which time the labour had considerably advanced, and the pains had become proportionally stronger. At the end of this period the pulse was 64, and the respirations 35 per minute, an



increase probably due to the continued muscular exertion and the advance of the labour, and unimportant, as being still below the natural standard. I now suggested the entire suspension of the chloroform, and the cries of the patient again became distressing, and the full consciousness of pain was again restored; she described her sensations as having been most agreeable, she had known everything that had occurred, and had been aware of the painful paroxysms, but had experienced the most grateful relief to her sufferings. The chloroform was again exhibited at a subsequent period, with an equally good effect. This case most clearly proves that which I have over and over again confirmed, that chloroform may be exhibited without the least alteration in the volume or frequency of the pulse.

So far is chloroform from being a stimulant to the heart, that I have observed it lower the pulse under the following conditions. A gentleman had been some hours in a state of great nervous excitement consequent upon a long vigil; when I entered his room he met me at the door with all the appearance of a maniac, he had not slept an hour together for many days, and for several weeks he had lost his usual rest; his pulse beat 94 in the minute. Under these circumstances I exhibited the chloroform, and in a few minutes the patient slept composedly: in this tranquil state the pulse quickly fell to 82; and after a sleep which continued upwards of an hour, the patient again awoke as from an agreeable dream, with his mental faculties fully restored.

I now proceed to notice the positive use of chloroform, and I begin with briefly discussing its advantages in all cases of labour, but most especially in those which require the active interference of the accoucheur.

In order that chloroform may be administered with success and safety, the person who administers it should be entirely free from any other responsibility, at the same time he must be made acquainted with the state of the female from time to time, and be able to appreciate all those peculiarities which may render the labour more or less painful. With these precautions I dismiss the question of safety to the mother, and proceed to enquire into its effect, first, upon the process of parturition, and, secondly, upon the child. I have exhibited the chloroform in upwards of thirty cases of midwifery during the present year, and they have included a greater number of severe cases than the general experience would support; this is accounted for by the fact that two of the worst were pauper patients, to whom the surgeon's attendance is required only in cases of unusual severity. One other formidable case also occurred to my father, and in it I was requested by him to use the chloroform. In this experience I have never once observed the least retardation of the parturient paroxysms, *so long as absolute insensibility was not induced*, and in several cases the pains were palpably increased. When a patient is suffering acute pain, she does all in her power to

suppress it, and the act of doing so is well known to retard the process of parturition ; when, therefore, the pain is no longer felt, the effort to suppress it no longer ensues, and the accouchement is accelerated in a remarkable degree. But again, it has been argued that the pain of labour is desirable ; and that it is wrong to interfere with this natural indication of what is going on. Now with this assertion I am totally at variance ; there is nothing so depressing to the powers of life ; nothing so soon exhausts the already feeble body ; nothing so effectually prevents the sufferer from aiding nature by her volitional effort, as pain ; and consequently nothing so powerfully maintains the strength, or invigorates the system, as its annihilation. In February last, I was in close attendance upon a female from six o'clock in the morning until half-past four o'clock in the afternoon, and during the whole of this time the pains were indescribably severe ; at half-past nine o'clock I administered chloroform, and its effect was continued until the termination of the case ; it was intermitted only to give the patient a little support, but whenever this was done she herself again requested to have it renewed. The case terminated favourably, and I have no hesitation in saying, with far less of exhaustion than would have occurred had no chloroform been given ; in every case in which I have administered it, the subsequent recovery has been far more rapid than usual.

Lastly, Does chloroform induce flooding ? In the

thirty cases I have attended I have not had a single case of flooding, and two individuals had never been free from it on former occasions. This is, in my opinion, an additional recommendation for its exhibition ; and in all those excitable persons in whom flooding is most likely to occur, the diminution of fear and excitement caused by its exhibition, has a direct tendency to prevent the flooding.

In the more severe labours, where interference is required, nothing can surpass the gratitude which is expressed for a breath of chloroform ; in performing such an operation I was compelled to intermit the chloroform, fearing to trust it in the hands of the nurse ; no sooner did consciousness return, and with it the full perception of the pain, than the patient cried out for it with such vehemence that I felt bound to give her another dose ; at this time competent assistance arrived, and the succeeding part of the operation was entirely unfelt.

The next enquiry regards the child. Nothing but a very extended experience can justify any conclusion upon this head ; as far as my own experience goes I am decidedly of opinion that chloroform exerts no perceptible influence upon the child. Now as I have had an unusually large proportion of still-born children in the cases I have attended this year, I must endeavour to show that they were clearly referrible to other causes. In the case of Mrs. P. related above, the chloroform was given for an hour and a half, at 3 p. m. the child was felt to be alive at

6 p.m. she again took chloroform for ten minutes preceding the birth, which was at 10 p.m. she was fourteen hours in active labour, and the pressure was sufficiently great to account for the death of the infant. The second was a case of placenta prævia, in which turning was had recourse to, but the hæmorrhage some time previously had been very severe. The third case was nearly like the first, with the exception that the patient had the chloroform for seven hours. This case has already been related; the death of the infant was clearly referrible to the extreme pressure to which it had been subject. The fourth case was also partial placenta prævia, in which hæmorrhage had existed at intervals for several months, and there was every reason to believe the infant had been dead some hours before delivery. She had the chloroform for one hour. The last case was a frontal presentation, occurring in a female aged 31, it being her first confinement. The labour had been lingering for three days, but it lasted eight hours in its acute form; she had chloroform during the last three hours. I have entered thus fully into the above cases, that it may be rendered more apparent that the still births were not caused by chloroform; but I may remark in addition, that other cases have occurred in which it was given for four hours, without the infant being at all affected, whilst in the first case in which I gave it the patient was kept in a perfectly *insensible state* for nearly two hours, and yet was the child born as healthy and as well as usual.

There are a few other forms of disease in which the exhibition of chloroform is especially useful. Dr. J. H. Burnet has the credit of employing it for mitigating the distressing pain which frequently accompanies the menstrual period. When the patient is suffering the most excruciating and exhausting pain, the relief afforded by a tranquil sleep induced by chloroform is most grateful; and the benefit is doubly conferred, inasmuch as the severity of the pain is permanently lessened. A lady subject to such pain had passed one sleepless night, and had every prospect of a second; she was tossed about by agony, and laudanum had with other remedies been in vain employed. Under these circumstances I had recourse to chloroform, and with the happiest results; my patient, after half an hour's sleep, awoke refreshed and tranquil, and now able to bear the mitigated pain.

Many forms of excitement are speedily relieved by a dose of chloroform, as hysterical restlessness, the mania of delirium tremens, and that constitutional irritation which follows severe shocks to the system consequent on injuries and surgical operations. Chloroform has been frequently used in dental surgery, and I have repeatedly given it in such cases. I do not however recommend either ether or chloroform in slight operations, unless the patient have the remedy administered before dinner, and **FULL TIME** be allowed for a short sleep after the operation is over; nothing is so important as **REST AND SLEEP**

after the exhibition of chloroform ; if sleep be not procured and permitted, sickness and a sensation of confusion frequently remain.

One word on the comparison between ether and chloroform,—I believe the former less dangerous, but more likely to produce vomiting, confusion, and other bad symptoms ; whilst the chloroform is more likely to produce asphyxia. The vapour of ether is less dense, and more readily mixes with the air, and it is extremely difficult to asphyxiate with it ; whilst that of chloroform is heavy, and slowly diffused, and being carried in a stream into the lungs, a small quantity may produce congestion and death. When, however, chloroform is cautiously administered, no effort being made to *force* it into the lungs, the taste and smell are more agreeable, and the odour more quickly goes off, and there is far less liability to subsequent derangement of the stomach and brain, than when ether is employed. On the whole I decidedly prefer it, and have never met with the least ill consequence from it. On one occasion only have I failed in giving it successfully ; and that was in the case of an hysterical female, who no sooner took an inspiration of air charged with chloroform, than she went off into convulsive movements of her whole frame, and after one or two attempts I gave it up ; the operation required to be performed was but the extraction of a tooth, and as the patient had formerly been the subject of puerperal mania, I recommended her to submit to the momentary pain.

In conclusion, my experience hitherto confirms in toto that of the talented accoucheur who introduced chloroform; I believe it to be one of the greatest blessings that Providence has ever bestowed upon the human family, and I should ill be acting in accordance with the precept, "Do good unto all men," if I did not raise my humble voice in its favour, and administer it in all cases, both rich and poor, in which experience and principle show it to be desirable.

THE END.





