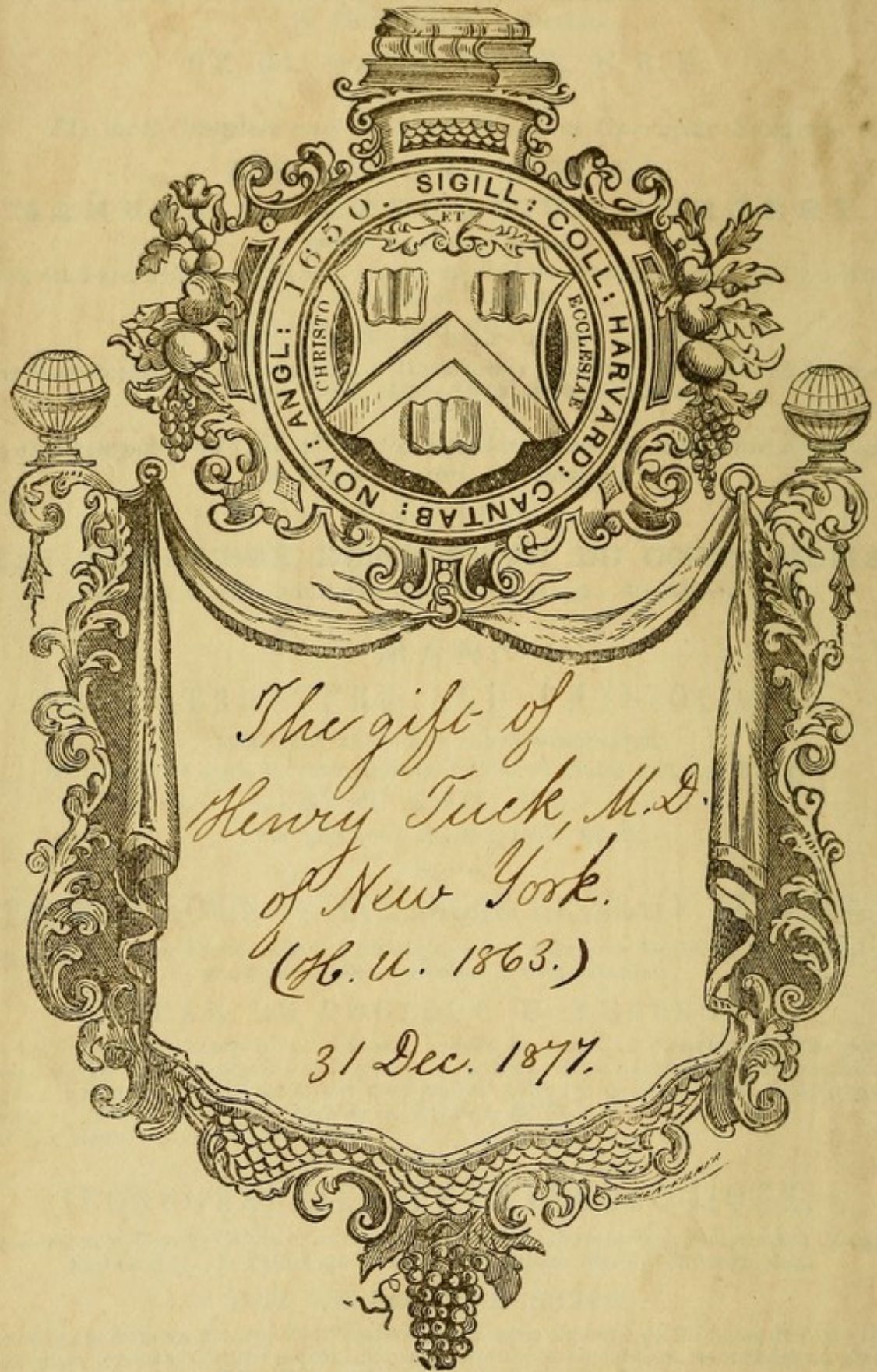
Chloroform : its properties and safety in childbirth / by Edward William Murphy.

CHLOROFORM IN CHILDBIRTH

Dr MURPHY.

ODONTOGRAPHY.*



Henry Tuck.
Dec. 1865.

CHLOROFORM;

ITS PROPERTIES AND SAFETY

IN

CHILDBIRTH.

BY

EDWARD WILLIAM MURPHY, A.M., M.D.

PROFESSOR OF MIDWIFERY, UNIVERSITY COLLEGE; OBSTETRIC PHYSICIAN,
UNIVERSITY COLLEGE HOSPITAL;
FORMERLY ASSISTANT PHYSICIAN DUBLIN LYING-IN HOSPITAL;
LATE PRESIDENT MEDICAL SOCIETY OF LONDON;
ETC., ETC.

"Νήδυμος Ὕπνος μὲν κασίγνητος Θανάτοιο."

"Take thou this phial, being then in bed,
And this distilled liquor, drink thou off.
When presently through all thy veins shall come
A cold and drowsy humor, which shall seize
Each vital spirit. * * *
And then awake as from a pleasing sleep."

ROMEO AND JULIET.

LONDON:
WALTON AND MABERLY,
UPPER GOWER STREET, AND IVY LANE, PATERNOSTER ROW.

M.DCCC.LV.

LONDON:
PRINTED BY WERTHEIMER AND CO.,
CIRCUS PLACE, FINSBURY.

DEDICATED

TO

SIR JAMES CLARK, BART.,

PHYSICIAN IN ORDINARY TO

HER MAJESTY.

PREFACE.

The following observations on Chloroform—its properties, mode of administration, and advantages—are intended for those who are willing to use this agent, provided they are satisfied that they can do so with safety. The object of the Author is not to continue a controversy on the merits or demerits of this anæsthetic, but rather to assist the inquirer who is anxious to give it a fair trial, but who may be intimidated from want of experience of its mode of action. There may be some, also, less hesitating, who will boldly administer chloroform, but who err from want of knowledge, and give it both more rapidly and in larger quantity than is required. Such recklessness may be fatal.

If these pages contain anything that may cor-

rect these errors, either from rashness or timidity, and, at the same time, lead to the general adoption of a most valuable means of assuaging the sorrows of childbirth, the object of the Author is fully attained. In his experience, he cannot speak too highly of its advantages, and trusts that the period is not far distant when, as the prejudices which surround it gradually subside, its value will be more correctly appreciated.

12, *Henrietta-street, Cavendish-square,*
November, 1854.

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CHLOROFORM IN CHILDBIRTH.

CHAPTER I.

INTRODUCTION.

On the fourth of November, 1847, Professor Simpson discovered the anæsthetic power of chloroform. Regardless of all risk and in the true spirit of science, he became the subject of his first experiment, inhaled the vapour to test its value; and having thus ascertained its properties, this agent was applied by him to assuage the sufferings of parturition. Its power was soon demonstrated; and Dr. Simpson at once published his discovery to the world.*

Very soon after the appearance of his pamphlet, I was summoned to a case of most difficult labour caused by extreme deformity in the pelvis. It was necessary to submit this patient to a most painful and tedious operation, and I determined to test the influence of chloroform. The vapour was administered, she fell into a tranquil sleep, the operation was performed and everything settled before she awoke. When she regained con-

* "An Account of a New Anæsthetic as a substitute for Sulphuric Æther in Midwifery and Surgery," by J. Y. Simpson, M.D., Edin. 1847.

sciousness she looked up, recognised me, said she felt no pain then, but was evidently in expectation of its return. When told that all was over, she was incredulons, but, at length convinced by her altered appearance, her countenance lighted up with an expression of thankfulness difficult to convey. The value of chloroform was proved; its subsequent effects, if any, remained a question: the case was watched most anxiously, and it was found that the prostration and restlessness so frequent in such cases were altogether absent; neither was there the slightest trace of inflammation which might naturally be expected from a labour unusually severe and prolonged. Her recovery was so complete that she was walking about in three weeks afterwards.

Encouraged by this success, chloroform was administered in several cases in which obstetric operations were required, and with the same results. These cases with remarks were published in 1848.* The introduction of such an agent into practice was not, however, very flattering; clouds of disapprobation were collecting on the horizon, which soon increased and burst in such a storm of controversy, that we were reminded of the polemics of the middle ages; only that in these later disputes, rather less attention was paid to logic.

Parturition is complicated with many accidents, both at the time of and after delivery: all these were attributed to chloroform, if the patient hap-

* "Chloroform in the Practice of Midwifery," by Edward W. Murphy, A.M., M.D. Taylor and Walton, 1848.

pened to inhale this vapour. Thus it became the cause of hemorrhage, convulsions, sloughing of the passages from the impacted head, craniotomy, puerperal fever, puerperal mania, as if these complications were never heard of until this so called destructive vapour was introduced. Those who were bold enough to use it, were held up to public odium, nay, it was even questioned, whether the act might not be considered criminal according to law. It was said that to render a parturient woman in this way, "drunk and incapable" was certainly a misdemeanour, and no matter what might be its advantages, we had no business to use such a means of abrogating what they were pleased to call "physiological pain."

The aid of the Church was summoned: it was insisted that the pains of labour were the "sorrows" of childbirth, and that to relieve the one, was to remove the curse signified by the other. It was assumed that the decrees of Omnipotence could be neutralized by this new power, and that the foreknowledge of the Deity did not extend to the discovery of anæsthetics. In vain it was urged, that the sorrows of childbirth signified much more than the pains of parturition; that man who was destined "to eat bread *in sorrow* all the days of his life," contrived to dine as comfortably as his means permitted, notwithstanding the curse; that in fact, the term *sorrow* could not be understood in so restricted a sense. Such reasoning availed but little; and, even at the present moment, there are pious persons whose judgment is shaken by

this interpretation of Scripture, who look upon Ætherization as sinful.

Pamphlets, tracts, essays accumulated; and in midst of this war of words, some further observations* were published by me, in the hope of removing by a fair statement of experience, some of the many erroneous notions entertained about it.

The tract was thrown upon troubled waters; the opposition to chloroform increased; at least so far as its use to relieve labour was concerned. In surgical practice it was employed extensively: a death sometimes happened; but, in the majority of instances, the cause was understood and appreciated, and chloroform continued to be used. These deaths were sedulously reported in the journals, both daily and medical, and thus the prejudice was strengthened.

With the aid of such facts, the obstetric opponents of the vapour excited no little alarm among the fairer portion of the public, who were naturally anxious to receive relief in their hour of trial. It was whispered that such a lady took chloroform in her confinement and became maniacal; some were obliged to be delivered with instruments, others were seized with epilepsy. In a third series of cases, it was said that fatal phlebitis and peritonitis were the consequences of its administration. Such were the rumours privately circulated,

* Further observations on "Chloroform in the Practice of Midwifery," by Edward W. Murphy. A.M., M.D. London, Taylor, Walton & Maberly, 1850.

and even openly published: the public, however, were never informed that all these casualties, so confidently attributed to chloroform were the well known accidents of labour, which might have taken place if chloroform had never been given. It was sufficient for these opponents that the patient inhaled the vapour to make it responsible for every evil consequence of parturition.

Notwithstanding the violence of this hostility—too violent to convince—the public were gradually arriving at the truth. A few plain facts assisted them in forming an opinion. The deaths from chloroform all occurred in the practice of surgery, yet they did not find surgeons hostile to its use. In the London hospitals chloroform had been administered in upwards of nine thousand cases. About nine deaths occurred, *not afterwards*, but in the moment of administration, nevertheless surgeons were not discouraged. As to subsequent injuries, which were so sedulously reported from the practice of midwifery, they knew nothing about them, and yet had such presented themselves it would be impossible to overlook them. If chloroform caused hemorrhage, it could not fail to induce secondary hemorrhage, the great dread of the surgeon. If it produced a greater susceptibility to the risks that arise from inflammation and fever, here were cases in which either might be fatal; yet surgeons did not find chloroform on this account dangerous. If it caused alarming prostration of the vital powers, nothing could be more calculated to interfere with the success of a

capital operation, nevertheless chloroform was used in such cases, and with a precisely contrary effect: it was observed that the shock of an operation, being by this means so much diminished, the chances of the patient were greatly increased. As for insanity, epilepsy, &c. these were found *exclusively* in obstetric reports, and hence the suspicion that to chloroform were attributed effects of parturition, which were known from the days of Hippocrates.

Those also who had the deepest interest in the question, who looked forward to their period of suffering with no little anxiety, and who made their inquiries, did not find these reports supported by facts. On the contrary, they heard from their friends who had experience of chloroform very different histories from those in general circulation. Ladies recovered better from their confinements after they had taken it than when they had not. They knew, also, that if deaths had occurred, if recoveries were protracted, if the catalogue of mischiefs attributed to this vapour had the slightest foundation in facts, it would be impossible to continue its use in midwifery, such objections could not be concealed, and would soon overwhelm those who adopted it with disgrace. Yet the distinguished discoverer of this valuable anæsthetic has not suffered in this way, nor others in the habit of using it. Hence the young mother began to doubt, then to disbelieve, and, lastly, to suspect, this too vigorous hostility.

Thus, notwithstanding this opposition, the use of

chloroform in midwifery has become general. It is universally employed in Edinburgh; has made converts in London among its warmest opponents, and has found its way even within the precincts of the palace.

The profession are beginning to open their eyes to the truth. They know the great responsibility which would be incurred by allowing chloroform to be administered to the highest personage in the realm, *if there was the slightest risk,* hence they may, perhaps, have some suspicions that these statements might possibly be but exaggerations, and conclude that its use is, at least, a proper subject for inquiry. They are prepared to admit that if its safety can be proved, it should be recognised as a means of relieving the sufferings of the parturient female.

Such seems to be the present position of this question; and in order to meet such a spirit of inquiry, I have ventured a third time to address a few remarks on chloroform, with the object of pointing out its influence on labour and its mode of administration, rather than with the desire of continuing any controversy regarding its merits. If the following observations are of any value, in aiding the inquirer anxious to know the properties and uses of the agent he wishes to administer, their object is fully accomplished.

CHAPTER II.

PROPERTIES OF CHLOROFORM.

Chloroform is one of many substances that possess similar properties only differing in degree.* Hydrogen and carbon form the base, which may exist alone, or be united to a third element, and thus form a ternary compound. They all possess anæsthetic properties, they influence the nervous system in a similar manner, but differ essentially in the degree and rapidity with which their effects are produced. Alcohol, sulphuric æther, chloroform, hydrocyanic acid, are examples of these ternary compounds which have anæsthetic properties, but of very different degrees of power.

* Anæsthetics.	Carbon.	Hydrogen.	Chlorine.	Oxygen.	Nitrogen.	Specific Gravity.	Boiling Point.
Benzin, or Benzole	2	1	—	—	—	0·8500	187°
Chloroform . .	2	1	3	—	—	1·4800	140°
Dutch liquid .	2	2	2	—	—	3·4484	180°
Sulphuric æther	4	5	—	1	—	0·7154	96°
Alcohol . . .	4	6	—	2	—	0·7960	172°
Hydrocyanic acid	2	1	—	—	1	0·6969	80°
Chloride of carbon	4	4	—	—	—	1·5520	248°
Chloric æther .	A mixture of chloroform and alcohol.						

For instance, the anæthesia of alcohol is slow in appearing; nor is it until the potations are prolonged and deep, that such an effect manifests itself; nevertheless cases have occurred in which an inordinate draught of brandy has been followed by instant loss of nervous power, and the drunkard has fallen down perfectly insensible in a state of anæsthesia.

Sulphuric æther acts more promptly, and is preceded by a stage of excitation not so prolonged, nor so boisterous, but still not dissimilar to that of alcohol.

Chloroform is yet more rapid in annulling sensation, and its exciting stage much shorter than sulphuric æther: and lastly,

Hydrocyanic acid acts with a rapidity that renders it a poison of most fatal power; there is no intervening stage but sensation, motion, consciousness; all nervous energy is instantly destroyed by it.

The third element of the compound seems not to be essential to, but rather to regulate the intensity of, the anæsthetic effect. The same hydrocarbon base combined with oxygen (alcohol, sulphuric æther) has less power than when united with chlorine (chloroform), and again the combination with nitrogen (hydrocyanic acid) forms an anæsthetic of the highest intensity. So also of the compounds with oxygen. Alcohol, which contains two volumes, has less power than sulphuric æther, having only one of oxygen. Anæsthesia seems to be at its maximum when the hydro-

carbon is combined with nitrogen, and a minimum with oxygen.

It has also been proved, that in the hydrocarbon base hydrogen is not the essential element, because chloride of carbon (carbon and chlorine) and benzole (carbon and hydrogen) produce similar effects; and hence the inference that carbon is the anæsthetic element which remains dormant until called into activity by the gases with which it may combine.

THE ACTION OF CHLOROFORM ON THE ANIMAL TISSUES has been the subject of close observation. Anæsthetics differ in their mode of action. Alcohol acts with most power through the stomach; less by inhalation, least, if at all, by the skin. Chloroform acts chiefly by inhalation, less through the stomach, and least by the skin, its action being only partial, and limited to the surface to which it is applied. Hydrocyanic acid conveys its influence by all these channels, and, if pure, will destroy life when dropped on the skin as rapidly as when received into the stomach or inhaled.

When the vapour of chloroform is received into the lungs, it is quickly expanded over all the air-cells; these are surrounded on every side by the ultimate capillary ramifications of the pulmonary arteries and veins, and also by the fine fibrillar expansions of the pneumo-gastric nerves; thus its influence may be conveyed to the nervous centres, either directly through these nerves, or indirectly through the blood, but the former belong to a division of the nervous system not susceptible to

its action unless in large doses, so large as to become dangerous. The blood is the channel, therefore, through which it exhibits its phenomena; by this means it is conveyed with great rapidity to every portion of the body, and hence its manner of combining with the blood becomes a question of importance.

Chloroform is not very soluble in the blood, not at all so much so as alcohol, and consequently a large proportion of free chloroform travels through the circulation. This is supposed to exert a strong affinity for oxygen, which is inspired, not sufficient however to absorb it and form new compounds, yet enough to prevent the usual affinities taking place. Carbonic acid is not, therefore, formed in the same proportion, and carbon not being sufficiently removed from the tissues, the anæsthetic element remains to exhibit its influence. Several facts seemed to prove the relation between anæsthesia and the expiration of carbonic acid. Dr. Snow has shewn, by numerous experiments, that the quantity of carbonic acid evolved from the lungs is diminished under the influence of æther and chloroform. Dr. Prout has demonstrated the same fact in drunkards; and again, it is found that extreme cold reduces the proportion of carbonic acid expired, and becomes an anæsthetic. It acts precisely as chloroform. There is the same loss of sensation (numbness) and prickly pain followed by drowsiness; the same inability to regulate voluntary motions, and ultimately complete *sopor*. Hence we infer that anæsthetic

force is in inverse proportion to the quantity of carbonic acid expired.

This disturbance of the respiratory function necessarily modifies the colour of the blood, but the degree and manner in which such changes are effected must depend, in a great degree, upon accidental causes, as well as on the power of the anæsthetic. Carbonic oxyde is one of the most powerful of these agents, and Mr. Nunneley observed, in animals poisoned by it, "that both venous and arterial bloods were *bright florid.*" Dr. Snow remarks, that "when the blood which flows from the arteries and veins can be separately examined, whilst the patient *is well under the influence of the narcotic* (*chloroform*), it is seen that the arterial blood is somewhat *less florid,* and the venous *less dark,* than under ordinary circumstances." Again, it has been found in animals slowly put to death by chloroform, for instance, after several experiments, that the blood in the arteries was *as dark as in the veins.*

It is probable that, in the first case, carbonic oxyde perfectly neutralized the oxygen, which passed freely through both sides of the circulation, and rendered the blood equally florid. In the second, chloroform did so to a certain extent, but only partially, hence that a certain proportion of free oxygen entered the veins, and an equal quantity of carbonised blood passed through the lungs unchanged to the arteries; and lastly, in the third case, in which there was sufficient time for the oxygen to be otherwise disposed of, all

the blood became carbonized by carbon which could not be removed. This, however, remains a question of enquiry; but there is no doubt that chloroform does not dissolve in the blood, as is the case with alcohol, nor does it make any change in its properties.

The large number of experiments (three hundred and sixty-three) performed by Mr. Nunneley on the lower animals render his remarks of the highest authority. He does not think that blood is changed, or, as it is said, "poisoned." "It does not lose its power of coagulating; nor is that which is taken from an animal in so complete a state of anæsthesia as to be presently fatal, or even immediately after death has been occasioned, when examined under the microscope, seen to be much, if at all, altered in its character, consequently, neither the fibrine nor the globules can be much changed; and unless the anæsthesia be very profound, or *prolonged*, the blood does not vary much in its color. *That which flows from a wound during an operation is as bright as usual.*"*

The action of chloroform on the nerves, and its manner of causing anæsthesia, is best observed by the effect of small doses of the vapour gradually increased. The blood conveys the vapour to the heart: the heart transmits it to every nerve in the body. But these are not all equally under its influence. Of the three divisions of the nervous system, the cerebro-spinal is the first affected, then the reflex, and lastly the ganglionic nerves.

* Trans. Prov. Med. & Surg. Association, vol. xvi. p. 359.

The first communicates sensations, motive power, volition, reflection; a small dose of chloroform will annul sensation without disturbing the power of motion or consciousness. An example will explain this. A lady suffered intense pain from abscess of the breast which was on the point of bursting. She could not bear to have it touched ever so lightly. I gave her an inhaler containing chloroform; she held it to her mouth and inspired the vapour two or three times. I could then touch and examine the breast without difficulty. Her face was directed from me breathing the chloroform, and while thus occupied, I plunged a lancet into the abscess. She did not feel the least pain, and was delighted to find the object of her dread so easily removed.

If the dose be increased, the power of motion is controlled, the hand drops, the patient cannot move herself, volition and consciousness begin to be affected, an imperfect sleep supervenes, the patient remaining in a kind of doze, yet will answer a question if asked distinctly; she will tell you that she hears everything that is said, but this is evidently not the case. As the cerebro-spinal system is getting more completely under the influence of chloroform, the next, the reflex, division becomes engaged. This presides over all the movements termed sympathies, over the passions or emotions, and over the whole respiratory apparatus. The excitor nerves of this division are first affected; the irritability of the eyelids, of the nostrils, of the fauces, and lastly, of the glottis,

are controlled; the motors then lose their power; the eye is drawn upwards; the respiration becomes stertorous; the action of the thoracic muscles is slower, less perfect; the inspirations are incomplete, and a form of asphyxia takes place which may be fatal. Hence the importance of observing the influence of this agent on the respiratory nerves. Fortunately, this loss of power becomes evident from the stertor which it causes, and although this may occur as safely as in natural sleep, still it must be looked upon as a beacon to indicate danger.

Thus far chloroform may be safely used, but if we pass one step beyond this, and increase the quantity of the vapour, or what amounts to the same thing, if we do not carefully guard against its too great accumulation, that danger is instantly present. The respiratory tract is the last portion of the reflex division of the nervous system, which becomes affected; stertor is its earliest evidence; the thoracic muscles then lose their tone; the inspirations are less perfect and at longer intervals; the chief muscular action is carried on by the diaphragm. At length this also ceases, and death takes place.

It is important to contrast this form of asphyxia with that more commonly observed in instances of drowning, strangulation, spasm of the glottis, etc., etc. The latter is caused by the absence of oxygen; the irritability of the respiratory nerves and the activity of the muscles under their control, remaining unimpaired. The former arises from a

deficiency of carbonic acid; oxygen is present, but the thorax cannot expand for its admission. In one case, the most violent efforts at inspiration are made, which gradually subside, as the blood becomes more perfectly carbonised and death takes place. In the other, these efforts are feeble, *ab initio*, and death occurs without a struggle. In both instances, the lungs present the same *post mortem* appearances. Death from intense cold will illustrate one form of asphyxia; death from croup, the other.

The quantity of the vapour that is sufficient to act upon the reflex nerves, may also influence the emotions. Sensation, reflection, volition have disappeared, the patient is in a kind of dream, which manifests itself by incoherency, inarticulate mutterings, and sometimes by more violent exclamations. The impressions produced by much suffering are occasionally exaggerated in this dream.

I was once summoned to attend a lady in her confinement, who had suffered very severely from her pains before I saw her. I administered chloroform in small doses, but apparently with little effect: the dose was increased, she rambled a little, and when the pain came on, shouted out much more loudly than before she was given chloroform. I was, certainly, rather puzzled but determined to persevere, I observed that she always slept in the intervals: the respirations and pulse were carefully watched, and the moment I heard stertor, the vapour was discontinued. A living child soon entered the world, and took part in exclamations that continued even after it was born. She soon,

however, became quiet, but when pressing the uterus moderately to expel the placenta, her vociferations were renewed. They soon ceased, she was left undisturbed and for some time asleep. When she awoke, I was surprised to find that she did not know when the child was born, she was not aware that she had been crying out. She said she must have been dreaming, and such, in truth, is the only explanation I can offer for this case, so remarkable an exception to the general rule.

The intimate relation between the reflex and the ganglionic nerves which chiefly supply the uterus, render their influence on its action in labour an interesting object of observation. We know that similar organs, the stomach, the bladder, the rectum are all largely supplied by the ganglionic and also by the reflex nerves, each have distinct duties to fulfil, but yet are in the most intimate relation with each other. Food or any other irritant, *excites* the *motions* of the stomach through the *excito-motor* nerves: its continued action and digestion are carried on by the ganglionic system, so also urine excites the bladder, fæces the rectum, but the expulsive efforts are ganglionic. It has been noticed long ago by Dr. John Power, that the expulsive action of the uterus is the result of irritation reflected from the cervix when expanded to its full extent. Dr. Marshall Hall's valuable discoveries have since been made known, and Dr. Tyler Smith has applied them to shew that the uterus is also under the control of the reflex system of nerves. Hence it is necessary to

determine how far chloroform, by controlling the activity of these excito-motors may arrest the action of the uterus. It seems to have this power to a certain limited extent. The periodic expulsive efforts of the uterus will continue, although this reflex force is destroyed, no inertia, no loss of tone is caused in the uterus, but its action may be deranged or suspended. If such, however, should happen, it is only temporary, the uterus still observes its law of periodic action; its contractions will return, and revive the energy of the reflex nerves. Cases have occurred over and over again, in which the patient was under the full influence of chloroform, without altering in any way the action of the uterus. A remarkable case occurred in my own practice which will illustrate this.

I was summoned to a case in which the arm presented: the waters had been sometime discharged, and I was obliged to turn the child. The patient was brought under the full influence of chloroform, and while in this profound sopor I proceeded with the operation. The pains returned regularly, and, in the interval between them, I endeavoured to pass my hand into the womb. I never experienced so much difficulty in consequence of the strong contraction of its fibres about the child. Chloroform did not relax them in the least degree, and so far as the operation was concerned gave me no assistance whatever. The patient however was saved from the intolerable suffering which attends this operation, and her recovery greatly promoted by its means. In other instances,

I found turning greatly facilitated, not by overcoming the contractions of the uterus, which was sufficiently yielding, but by relaxing the passages.

The third division of the nervous system, the ganglionic, is the last to yield to the influence of anæsthetics. Chloroform may overcome the cerebro-spinal centre of sensation, motion, volition and reflection; it may paralyse the excito-motor spinal axis, disturb or even exalt the emotions, and yet scarcely touch the ganglionic system.

This is a most valuable fact in relation to its obstetric use, because one of the objections, levelled with the most force against the administration of chloroform in labour, is the assumed danger of paralysing the uterus,—an objection the more specious, because the action of the uterus may be for a time suspended under its influence. The difficulty of paralysing the uterus may be best learned from the following experiment related by Dr. Tyler Smith.

"A guinea-pig was *nearly* killed with chloroform, and a stilette at once passed through the whole spinal marrow from the cauda to the cranium. But no spinal movement of any kind took place. Chloroform had obliterated excito-motor irritability. *The spinal marrow was broken down entirely. Still the peristaltic action of the heart, intestines and uterus had not ceased.* The heart and intestines both contracted and dilated as having to receive and transmit onwards their contents. The uterus only shortens itself as in the effort to expel its contents through the vagina. *The uterus and intestines continued to act moreover after the beat of*

the heart had ceased. Thus, there is apparently a definite order of dying in the different organs under the control of the ganglionic system.

*In the human subject, the uterus evidently contracts so as to deliver its contents after both heart and intestines have ceased to act, it is the ultima moriens of the ganglionic system, just as the respiratory are of the spinal system.**

Chloroform may, however, stop the action of the heart if directly applied to it. This has been shewn by experiments on the lower animals. I have narcotised a kitten with chloroform; the heart was exposed, still palpitating, some chloroform was dropped upon it, the action ceased but was quickly renewed when the chloroform evaporated; this was repeated several times. This fact has an important relation to the mode of its administration. When a concentrated dose of pure chloroform is inhaled "the poison," as Dr. Sibson observes, penetrates the heart from the lungs in a single pulsation, and, at the beginning of the next systole; the blood is sent through the coronary artery to the whole muscular tissue of the heart. The blood passing into the coronary artery is less diluted, is more strongly impregnated with chloroform than the blood in any other part of the system except the lungs." The direct effect of chloroform on the heart is also shewn by the experiments of M. Gosselin. In one experiment, he injected two grammes of chloroform into the external jugular vein of a middle-sized dog. The animal died in less than a minute: an examination

* London. Med. Journal Dec. 1849. p. 1109.

was made immediately after death, and the heart was found voluminous and distended. In another, he injected three grammes: the animal appeared at first to suffer a little, then stretched out its paws without any convulsive movements, let its head drop, and died. The whole occupied less than a minute.* These facts may explain the cause of death in the majority, if not in all the instances that have been reported; the symptoms seem identical.

The first death from chloroform occurred at Newcastle-on-Tyne, January 28, 1848. Hannah Green, a girl about fifteen, required to have the toe-nail removed, a tea-spoonful of chloroform was poured on a table-cloth and held to her nose; "*after she breathed twice she tried to remove it*"; being desired to continue to inhale; in about half a minute, *the muscles of the arm became rigid and the pulse weaker.* The operation was commenced: "she gave a jerk, her eyes were closed; they were opened, and remained open; her mouth was open, her lips and face blanched"; she was evidently in *articulo mortis;* she was laid on the floor, and an attempt made to bleed her, but she was dead.

One of the latest happened in St. George's Hospital, May 11, 1854. "Mrs. H., a pale delicate-looking woman, was brought into the operating-theatre to have a tumour removed from her left breast. She appeared very nervous, and having

* Archives générales de Médecine. Tom. XVIII. Dée. 1848.

been placed on her back in a half-reclining position, the administration of chloroform commenced. *Apparently, from excitement, she did not inhale well,* but drew her breath by deep catches, and irregularly. Very shortly afterwards, not more than a minute and a half from the commencement of the inhalation, *her breathing suddenly ceased, and she became deadly pale*; on placing the finger on the wrist no pulse could be found." She was dead, and every effort, although various and skilfully applied, failed to revive her. After death, the heart had been found distended with fluid blood which it could not propel; it was small and fat, the right ventricle especially loaded with adipose. The intervening cases differ but little from these in their leading characters. The patient generally struggles against inhalation; then, in about two minutes, and often in much less time, a sudden pallor is observed with or without convulsion; the pulse is lost, and death takes place. After death, the lungs have been found congested, just as in M. Gosselin's experiments; hence the assumption that asphyxia is the cause, but there was not a single symptom of asphyxia in the sense that the term is generally employed. The cause of death seems to be the direct action of chloroform on the fibres of the heart, perhaps weakened by disease. In order to produce such an effect the dose must be concentrated, which would necessarily cause a spasm of the glottis, and feeling of suffocation, which prevents the patient inhaling.

The heart has been found filled with fluid, or semi-coagulated blood, which is just what might

be expected. Every dissecting-room student knows, to his great inconvenience, that all the large veins, the venæ cavæ, etc., contain fluid blood for a long time after death. If this be drawn towards a relaxed heart which cannot propel the blood, it becomes distended; and there is no reason why it should coagulate firmly here no more than in the veins. It is not necessary to assume that the blood is "poisoned" to explain such an effect. In some instances the left ventricle has been found empty; caused, probably, by the contraction of tissue — the *rigor mortis* — which occurs after death. A powerful dose of chloroform can destroy even this last trace of muscular irritability.*

Death from Chloroform seems to commence at the heart. To accomplish this, the dose must be concentrated; if pure chloroform, not sufficiently diluted with atmospheric air, were conveyed to the lungs and thence to the heart, less than a drachm would paralyse it. The immediate effect would be spasm of glottis, sense of suffocation, resistance of the patient; but if this be overcome, and the inhalation persevered in, chloroform rapidly overcomes the spasm, and enters the lungs with fatal rapidity. In order to avoid such a risk, chloroform ought to be given much more gradually, and in a greater state of dilution; its effect can then be better observed, and the dose, if necessary, increased; the finger, *which should never leave the pulse,* will mark the heart's action; but,

* Vide the late Mr. Barlow's experiments; Lond. Med. Gazette, vol. xlviii. p. 713.

inasmuch, as the reflex nerves are influenced before the ganglionic, all the signs given by them, diminished irritability, stertor, &c., will present themselves *before* the pulse is affected; consequently, unless from some unforeseen cause, no accident can occur.

A longer time might be required for the administration of chloroform—longer than might be convenient in an operating theatre—but this objection could easily be removed by adopting the practice sometimes followed, that is, to commence the inhalation in time before the intended operation, to do so in a different apartment, and when the patient is prepared, to have him or her brought into the theatre for the purpose intended.

This, however, is a digression from our proper subject, it applies to chloroform in the practice of surgery. The vapour need never be given to such an extent in the practice of midwifery, and as we shall presently prove, may be administered without the slightest risk or danger.

Deaths occurring several hours, some days, after the inhalation, are obviously the result of other causes. It is impossible for chloroform to produce so distant an effect. It does not combine with nor alter the blood, it evaporates from it most rapidly, and therefore to suppose that it can cause death long after it has disappeared from the system, seems to be, to say the least of it, rather incomprehensible.

CHAPTER III.

OBSTETRIC USE OF CHLOROFORM.

HAVING briefly explained the nature of chloroform and its manner of exhibiting its anæsthetic power, we are prepared to consider its obstetric use, its influence upon the parturient woman, the modes of its administration, its advantages, its objections.

The obstetric use of chloroform will be best understood by considering its influence as progressive,—one of degrees or stages. The first stage is that in which consciousness is retained, sensation is diminished or lost, motive power impaired. The second is the stage of transition, the dream before sleep or before waking; it may be a stage of stimulation or excitement, of rambling or incoherency. The third stage is that of profound sopor, the patient is quite unconscious, incapable of motion, perhaps in a stertorous sleep.

The first degree is generally sufficient in ordinary cases of labour.

The second is but transitory, and it is always desirable to avoid its continuance. This may be done either by withdrawing the vapour altogether which restores conscious-

ness, or increasing the dose, by which means the vapour attains

The third degree, in which sopor is induced. In obstetric practice it is never necessary that sopor should be so profound as in surgery, because surgical operations require that the patient remains perfectly still. This is not essential in midwifery, if sleep supervene it is tranquil, not stertorous.

Its influence on the parturient woman is nearly as follows:—If chloroform be inhaled gradually by a woman in labour, the immediate effect is a diminution in the intensity of the pains; she is perfectly conscious and self-possessed, and is delighted to feel that her extreme suffering is relieved; "She is in heaven" (to adopt her own language), still she suffers pain during the contractions of the uterus, but in the intervals between them is perfectly at rest; there is no lingering pain, no sense of soreness after the pain has ceased; she is disposed to sleep, and if she should not, she remains at least tranquil until the next pain; its return is again relieved by chloroform as before, but not removed. Thus chloroform may be given, at intervals, for a long time without any other effect than, as it were, blunting the pains.

If the dose be increased, or if the smaller dose be so frequently repeated as to cause an accumulation of the vapour, she complains of a tingling sensation through the arms and legs: if holding at the time a towel, or sheet, the arm has less

power and drops down. She may speak of unusual sensations, a vertigo, palpitations, although the pulse is perfectly tranquil, a disposition to dream. At this point some are frightened and refuse to inhale, others are delighted with their sensations; and, again, others will exaggerate their pains, and as they come on cry out more loudly than before chloroform was given; these exclamations, as they subside, merge into incoherency. If chloroform be then removed, so that its effects pass off, she has no recollection of the pain which caused her expressions of anguish: if, on the other hand, chloroform be continued, the incoherent talking becomes inarticulate muttering; she has less power of motion, the pains are sometimes suspended, and when they return she bears down with them: she seems to be asleep in the intervals, but if the eyelids are touched winking is excited, and she may ramble about some topic of her dreams. At this transition stage it is very desirable not to make a vaginal examination, still less to perform an operation, the mind is not sufficiently master of itself, and ideas may be excited which it is desirable to avoid. This is not necessarily the case; on the contrary, I believe it very seldom happens, but such cases have been related, and when they do occur it must be at this stage that such effects are observed. Operations cannot be performed because the woman becomes restless and unmanageable. A little more chloroform is necessary and then sopor succeeds; she feels no pain, and is quite un-

conscious of anything that is done. At this degree the eyelids may be touched without winking, the pupils are drawn upwards, there may be stertor, and if so, chloroform should be withdrawn. This state may be continued with safety during any ordinary operation, and is extremely useful if it should be severe, as in some cases of turning and perforation. A forceps operation may also require this extent of anæsthesia, but not necessarily so.

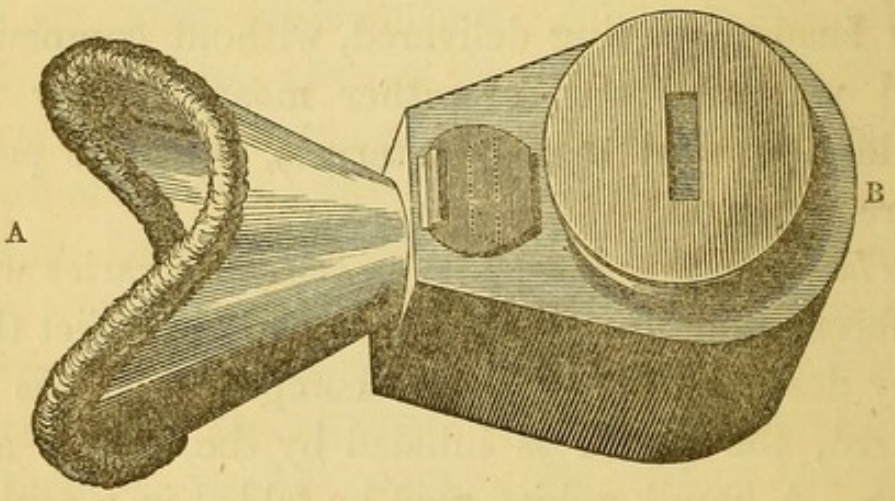
In the second degree, when the reflex system begins to manifest its influence, it has been stated that occasionally the exclamations of the patient are rather exaggerated than controlled; so also when profound sopor is induced, it sometimes happens that she cries out, as if suffering from pain, and yet, when consciousness returns, is not aware that she did so; she has no recollection of pain; she will tell you she had none. I was once called to a case of difficult labour in which this occurred. It was the first child, and the woman had suffered very severely for twenty-four hours. The head was arrested in the pelvis, and it was necessary to extract it with the forceps. Chloroform was administered to its full extent; the woman was in a profound, but not stertorous, sleep. She lay on her side, perfectly unconscious of anything that was done. She did not notice the first efforts at extraction; when suddenly, as the forceps was pulled, she exclaimed, "Oh! my back." She did this two or three times; but as the child was being delivered, she said nothing, and seemed asleep.

She remained thus for about half an hour, during which time the placenta was separated, and the bed settled. When she awoke, she was very much astonished to find her troubles over. She did not know when the child was born, said she suffered no pain, and when told that she had exclaimed loudly during the operation, she could not believe it.

This fact has been observed by others, and an explanation of it attempted. It is needless to do so: it is sufficient for our purpose to notice it as evidence that, when a patient is under the influence of chloroform, her expressions are no measure of the amount of pain which she really endures. In the transition stage, she sometimes exclaims when there is no pain, and is silent when there is. A lady in this state bore the expulsive pains when the head was being delivered, without complaint, and yet cried out, or rather moaned, after the child's birth, at regular intervals, as if the pains were going on.

The mode of administering chloroform varies with different practitioners, according to the effect that they desire to produce. If complete sopor is required, the vapour is inhaled by the mouth and nose. A handkerchief may be folded in a conical form, and a sponge placed in it containing chloroform; this may be applied to the mouth and nose, not closely at first, but gradually brought nearer and nearer, watching the effect, until both are quite covered by it. In this manner chloroform may be made to exercise its full power, and it is here that inattention may do so much mischief.

For instance, if the sponge containing chloroform be applied to the mouth and nose too closely at first, so that pure or very slightly diluted chloroform enters, it produces cough, and a sense of suffocation; the patient resists; but if her opposition be overcome, the sponge kept in place, and the vapour still inspired, she becomes at once powerless; the glottis is relaxed, and if the vapour is carried in any quantity to the heart, death may take place. This could not occur, if the inhalations were slower—more gradual. Inhalers are also used, which are applied to the mouth and nose, and are so contrived as to admit atmospheric air to enter freely with the vapour. I have been in the habit of using an inhaler that is applied only to the



A. Mouth-piece.
B. Box containing sponge for chloroform.

mouth, which seems to me the safest mode of administering chloroform that can be adopted, although not the best, if the full power of the vapour is required. Chloroform may be given either to lull the pains without disturbing the consciousness

of the patient, or to remove all pain by inducing sleep. The first mode is applicable to ordinary cases of labour; the second is used in some severe obstetric operations. The inhaler that I allude to accomplishes the first object perfectly, because the vapour which enters the lungs is so much diluted with atmospheric air that its power is greatly weakened, nor, until the inhalation has been continued for some time, does it cause anything like sopor. This may be understood, if we reflect that the nostrils are the channels through which respiration is chiefly carried on, respiration may go on perfectly and easily while the mouth is shut. If, then, this vapour be inspired by the mouth, double the quantity of air enters through the nostrils, precedes its entrance into the lungs, and shields the cells from its too powerful influence: hence a very small volume of chloroform is received into the circulation, just sufficient to lull sensation. If the inhalation be repeated at short intervals, this quantity will gradually accumulate, and thus slowly induce sopor. The following case will explain this.

A lady had been confined with her first child: she suffered very severely with her pains; so much so, that when I arrived at the house, her exclamations were loudly audible the moment I entered. When the pain had ceased, there was an interval of rest, and just as she began to move uneasily (the monitor of the next pain), I gave her some chloroform through the inhaler; the pain soon came, but she did not cry out as before; she moaned with it, grasped the inhaler, moved about uneasily, and

when it ceased was equally surprised and delighted with the relief she experienced. So it went on for some time, inhaling just before pain. At length, as the head arrived at the outlet, she was more under the influence of chloroform. She lay asleep in the intervals, sometimes muttering; the pain roused her, she moaned, and as it ceased she relapsed into a kind of doze. As the child's head was passing over the perinæum (a time when the pains are always more severe), she did not mind it, an expulsive effort and a slight groan were the only indications she gave. The child was born, she remained asleep, the placenta was expelled by pressure on the fundus uteri; she moaned, but was scarcely disturbed; while in this state, the bandage was applied, and the bed settled. In about a quarter of an hour she gradually recovered consciousness, and said she knew quite well every pain she had, but did not know exactly when the child was born; she thought she felt it, but was not sure. In this instance my patient remained perfectly collected and conscious for about two hours from the first inhalation; in the next hour sopor was more manifest in the intervals after pain, and in the fourth, when the child was born, the pains themselves were scarcely noticed, the vapour slowly accumulated with each succeeding inhalation, and the symptoms of the first stage gradually merged into the third.

The quantity of chloroform required on the sponge when used in this manner varies from a drachm to two drachms. I was in the habit of limiting my-

self to a drachm by measure, but I soon found that so much escaped by evaporation, this quantity had little effect; it was therefore increased, and its strength tested by a different method. I generally inspired the vapour before administering it: if the quantity used is not sufficient it produces no effect, if otherwise, it feels very slightly pungent, and excites cough, precisely as the inhalation of ether, but in a less degree. By this means, also, impure chloroform may be detected, being much more pungent, and causing more irritation. The inhaler may be applied to the mouth, just before the pain commences, and continued so long as it lasts; but the moment the pain ceases, it should be removed, and only re-applied on its return.

It is sometimes advisable to fan the patient, when the inhaler is withdrawn, in order to disperse any chloroform that may remain about the mouth and face, because, being much heavier than atmospheric air, it does not ascend rapidly, consequently more may be inhaled during the intervals of the pains than the exhibitor is aware of, so also the position of the patient may make a difference in the effects. When she lies in the usual position, on her side, the inhaler is either on or below the level of the mouth, and she inhales only so much as she can inspire, but if she lie on her back, and the inhaler be applied from above downwards, more vapour passes into the lungs than would be drawn by the act of inspiration, if the positions were reversed. *The inhaler should never be applied in the intervals of the pains.*

The time that the patient should commence inhalation depends very much on the circumstances of the case. I generally select the conclusion of the second stage of labour, that is, when the head of the child is descending upon the perinæum, because then the pains are generally intolerable, and the perinæum yields more readily under chloroform than without it. If, however, previous to this, the pains are so acute that the patient is evidently unequal to her suffering, chloroform may be administered without hesitation.

There is one condition of the cervix uteri in which I have given it with great advantage in the first stage of labour. The neck of the womb is sometimes caught and greatly compressed between the head and the pelvis. The pain is excruciating, and the action of the uterus is often deranged or suspended, the woman cannot endure her agony and her strong apprehensions interrupt the pains. Let her have chloroform and she becomes tranquil, the action of the uterus returns regularly, and the dilatation is soon completed. Under such circumstances, I have given chloroform when the mouth of the womb was not opened more than a sixpence, and was gratified to find the dilatation advance most rapidly. But if the parturient woman does not suffer so acutely, and many do not, if she can bear her pains well, and labour is making a regular and satisfactory progress, there is no occasion to use chloroform *in such a natural labour*.

The sense, however, in which this term "natural labour" is commonly used, embraces within its

meaning cases of the greatest difficulty. It is true that the expulsive efforts of the uterus are successful, the child is born without the aid of instruments, and within the prescribed period of twenty-four hours; but such is the agony which the patient experiences within that time, that I am satisfied, the exhaustion of the patient—the mental depression—the diminished energy of the vital forces which follow—predispose more to slow and troublesome recoveries,—if they escape more serious attacks,—than any other cause.

I have known this intensity of pain cause convulsions. I was requested by a medical friend to see a patient of his, in labour of her first child. He described her pains as being most intense, she was scarcely able to endure them: that morning, in the middle of a paroxysm of anguish, she was seized with a convulsion, which assumed the epileptic character; several fits followed, and in fact superseded the pains. He became alarmed, and requested my assistance. I found the neck of the womb thinly spread over the head of the child, and forced down almost to the outlet—*the mouth of the womb was not the least open*—the woman was then conscious, and complained very much while the examination was being made. I never met so much irritability of the cervix, and, fearing another fit, I withdrew my finger.

It was agreed to let her inhale chloroform when the paroxysm was approaching, which had a most beneficial effect: the convulsion was arrested, and the pain returned, which she bore patiently. Thus, in

place of every uterine contraction being marked by a paroxysm, they returned at long intervals; she had only three or four in the following twelve hours. At this time the head arrived at the outlet, and a still-born child was removed by the forceps. In all such cases, where the pains that accompany the first stage of labour are greatly aggravated, chloroform is invaluable.

The same dose of chloroform given in precisely the same manner, produces different effects on different constitutions. With some, the first inhalation gives instant relief, and if continued, soon produces sopor. With others, the inhalations may be frequently repeated before any effect is perceived. Some cannot take it without being excited: they ramble, and soon become incoherent. Others experience the most delightful sensations. When chloroform acts promptly, the inhaler should be applied only at lengthened intervals, merely to lull, but not remove the pains. If slow in its action, it may be inhaled also by the nostrils; this mode of increasing its power may induce sopor, but this is preferable to the uncertainties of the smaller dose, which scarcely relieves the patient. If it cause excitement, it is better to withdraw the vapour altogether, unless, indeed, the sufferings are very intense, and then it is advisable to induce sopor.

Pure chloroform causes no inconvenience during its inhalation, when given in the gradual and cautious manner we have mentioned. If violent cough or spasm, or sense of suffocation be excited, chloroform is given either too rapidly or it is im-

pure. Impure chloroform often excites great bronchial irritation; the impurities arise from the presence of alcohol and formic acid. M. Miahle adopts the following very delicate test of the presence of alcohol.

Place some distilled water in a tube or glass, and drop on it a small quantity of chloroform; the greater part sinks immediately to the bottom of the vessel, owing to its great density—a small quantity floats by repulsion, but may be made to fall in small globules by agitation. If the chloroform be pure, it remains at the bottom of the vessel, but if it contain only a small portion of alcohol, the globules acquire a milky opacity. Litmus paper determines the presence of acid. A simpler and much more convenient test; one that is at least quite sufficient to excite suspicion, is to rub the palms of the hands with chloroform; if the odour be fragrant it is pure, if pungent the contrary.

The action of the uterus under chloroform is not generally interrupted. The uterine contractions are governed by the reflex or excito-motor and the ganglionic nervous systems. The latter is never influenced, and will always maintain them. The former requires the full dose to disturb its power; a moderate dose (that which I have recommended) has no effect at all on the reflex nerves; nay, it may rather irritate than control their power. The uterine contractions are sometimes increased under the influence of chloroform, and labour makes a more rapid progress. It is true this may arise from

the removal of the great disturber of uterine action, mental anxiety, and dread of pain; but it it may also be explained by excitation of the excito-motor nerves rousing up the uterus to increased action. If, however, the action of the uterus be suspended, because these nerves are getting under the influence of chloroform, the effect is only temporary, because the ganglionic system restores the contractions, while the very fact that the reflex system is thus affected renders the passages much more yielding and dilatable than before.

But in many cases, where the pains have been suspended, I have great reason to doubt that chloroform had anything to do with this result. I attribute this suspension to another cause, which has quite as great an influence over the true spinal system as chloroform. Mental emotions exert this power: it is well known that nothing interrupts uterine action more than sudden shocks or great dread. The experienced practitioner is well aware of the importance of caution in the kind of conversation going on in the lying-in chamber,—a sombre look or an unguarded word may excite the fears of his patient, and interrupt labour; nay, a vaginal examination sometimes stops the pains, because the patient is taken by surprise,—his very entrance into the apartment will cause a delay in the return of the next pain. It is not surprising, therefore, that if he prevail upon his patient to inhale some chloroform,—a new medicine, said to be most dangerous

—that sometimes has caused sudden death—that even the doctors themselves are not agreed upon using, but, on the contrary, which some condemn in no measured terms,—it is not wonderful if a patient, whose mind is thus prepared, should find the first inhalation of chloroform stop her pains. I am satisfied that such is the case in some instances from the very contrary effect taking place in other cases from precisely the same cause.

Some patients dread their pains much more than either chloroform or its exhibitor; they had previously struggled against them, and their fears had caused a suspension of the pains, but the moment that choroform is inhaled, and the patient experiences its soothing influence, the pains return with increased force, and labour, that may have continued inefficiently for hours, is rapidly concluded. Cases of the former description are well calculated to embarrass the practitioner who ventures on the use of chloroform. The vapour is administered, labour proceeds more slowly, friends become anxious, and are prompted by the question—Can this be the effect of chloroform? If another opinion is sought for, and the consultant happen to be one of those "discreet and experienced practitioners" who oppose the use of this agent, there is no doubt that their fears will be fully confirmed by a decided affirmative, and probably the case quoted as an additional instance of the mischiefs of chloroform.

I was engaged to attend a lady to be confined with her fourth child, she had previously been

attended by a gentleman in extensive practice, who was very hostile to the administration of chloroform in midwifery. She was of a very irritable temperament, had a great dread of pain, and looked upon her approaching trial with great apprehension. I requested liberty to use chloroform if I thought it necessary; to which she most willingly consented "if I *thought it safe*". I assured her I did so. Her nearest relatives, however, had heard a great deal about it which they did not like, so they demurred and I did not press the point. However, when the time came for her delivery, the pains, as she expected, were very severe; she bore them for a long time with fortitude; her courage at length gave way, and her friends began to hesitate. "I might give chloroform if I was quite sure it would not hurt her." I did so with the greatest benefit; she became quite tranquil, her voice was not heard in the next room, and the labour was making a rapid progress; but as the head entered the pelvic cavity it descended in an unfavourable position and was arrested, labour was delayed, the pains became weaker, and the fears that had been previously kept in subjection returned with increased force. Finding myself surrounded with grave and lengthening faces, I determined to remove the cause of delay with the forceps; they were applied, and the child delivered living in about ten minutes. All were surprised and rejoiced, and nothing further was then said about chloroform, as the lady made a most favourable recovery.

However, she became again pregnant, and again required my services, she was determined to have chloroform, although I could perceive that it was an agitated question. It was said, that on the last occasion labour was delayed, and the child obliged to be brought into the world because of chloroform, *they heard of many such cases,* etc., etc. My patient, nevertheless, would have her way, and resolved that she never again would suffer the torture she had formerly endured. Labour commenced with its usual severity; chloroform was given, and in about three hours the child was born, and the whole matter concluded with scarcely any suffering. The friends were now convinced that chloroform was not so dangerous as they had supposed, nor the cause of delay in the preceding confinement.

I mention this case as an instance of, I am persuaded, many that are quoted to prove the evils of anæsthetics. It will illustrate the manner in which such rumours get into circulation, and the caution with which anything less than direct and clear evidence should be received. It is not sufficient to say, that such and such consequences followed *after* chloroform, they should be clearly proved to be *caused by* this vapour. Still less should we receive second and third editions of such reports. I was once seriously informed, that the wife of a medical gentleman, whom I knew, most unfortunately took chloroform during her confinement, was seized with puerperal mania a few days after and died! In the following year I

had occasion to meet this very gentleman, and the subject of chloroform being introduced, I made many cautious inquiries about his late wife. I was informed she was living!—and he was not at all satisfied that chloroform had anything to say to her attack.

The inhalation of chloroform in severe obstetric operations is similar, but in a less degree, to what is required in surgical operations. For this purpose the sponge and folded handkerchief answers perfectly well. There is a great variety of inhalers: one of the simplest is that contrived by Dr. Fleming of Dublin. "It consists of a small glass capsule with a partially overlapping border, and having a stem attached to it. This capsule is somewhat oval in shape, its long diameter being two and a half to three inches, and its depth sufficient to contain a sponge of commensurate size. Around the neck of the stem of the capsule is attached another sponge, so scooped and trimmed as to have a shape to include the mouth and nose, and so porous as to admit the free access of atmospheric air. This sponge should be about three inches deep in its inferior wall, in its upper about two, and by securing the capsule nearer the upper than the lower wall an inclined aspect is given, which is most important."

Dr. Fleming has altered the glass capsule. "The stem in place of being solid is tubular and of a size to admit the top of the finger underneath where it is trumpet-shaped, whilst,

on its upper portion, it is bevelled out on a plane below the rim of the capsule, so that the chloroform sponge may rest upon it, and the air play over it when in use according to the will of the surgeon".* The small sponge which Dr. Fleming calls "the chloroform sponge," contains about a drachm of chloroform when filled, and thus the quantity is regulated.

When chloroform is administered by any of those inhalers which concentrate the vapour, the quantity used should never exceed a drachm, and even then its effect should be closely watched, lest the undiluted vapour should enter the lungs. This can hardly occur without some notice, because of the spasm of the glottis it excites; but if this warning be neglected, and the vapour still applied, notwithstanding the struggles of the patient, the glottis would soon be in an opposite condition and the vapour too freely enter. This neglect, I suspect, was the cause of death in more than one instance. The inhaler, which is applied to the mouth only, is by far the safest of these instruments, because the quantity of vapour which passes into the lungs is so very small, so much diluted, that no sudden accident can happen; and being administered gradually, its increasing power may be observed.

* Fleming on Chloroform, pp. 28, 29.

CHAPTER IV.

ADVANTAGES—DISADVANTAGES OF—OBJECTIONS TO CHLOROFORM.

The advantage of chloroform in obstetric practice consists, not alone in its power of controlling the intensity of suffering to which the parturient woman is too often unnecessarily exposed, but in promoting a more favourable recovery. Since the publication of Mr. Travers' valuable work on "Constitutional Irritation," the profession acknowledge the danger that sometimes results from intense pain. Patients have died of the shock of an operation. It is denied, however, that the pains of labour, be they ever so intense, produce any shock to the constitution; I believe this to be utterly untrue. I know nothing that predisposes more to troublesome consequences than long continued and severe pain, especially with delicate women. Their recovery is always slow, and while in this depressed state, if a morbid poison be within reach, they are sure to absorb it. The experienced practitioner knows well the risk of constitutional exhaustion which nothing promotes more than intense pain. The following case may serve as an illustration.

A poor woman had been a patient of University College Hospital during the years 1849, 1850. She suffered from dysmenorrhœa, stricture of the cervix uteri, and very narrow os tincæ. She was highly hysterical, and all the usual means failed to give her relief. At length I divided the stricture, she got better and I lost sight of her. She returned, however, in 1852, pregnant, to apply for assistance in her approaching confinement.

She received a letter for attendance, and I committed her to the charge of two very intelligent and experienced gentlemen : more careful inquiries were made about her ; and it appeared that she was the servant of an old gentleman who had ample means at his command, and there was strong reason to suppose that he had a most confidential interest in her present situation. Why she applied to the hospital as a pauper, was explained to me by the fact, that this gentleman had the reputation of being a miser, so I at once determined that he should pay for her. She was informed that the hospital was for those only who were destitute ; that under the circumstances we could not take charge of her, but that if she made her own arrangements with her medical attendant, I should give my services in the same manner as I at first intended, if they were required. She did so, and her confinement commenced January 10, 1853. During that day labour pains, or what were supposed to be such, returned at intervals. She was highly irritable and impatient ; she could not endure these pains, and

sent nearly a dozen times for her medical attendant. To relieve her anxiety, he sent for me. I found that true labour pains had not yet commenced, so she was given a full anodyne.

January 11 was spent in a similar manner. She got some sleep; but in the morning the same teasing pains returned, and continued throughout the day. Chloroform was suggested, but she would not hear of it. The anodyne was repeated.

January 12.—The first true dilating pains commenced with great severity, the mouth of the womb opened a little, but was very rigid and unyielding: leeches were applied with relief, and were followed by some advance in the dilatation; but again it remained stationary. She became very impatient after suffering, threw herself about the bed, was constantly moaning, whether the pain was on or off, the only difference being the increased loudness of her exclamations during the contractions of the uterus,—she would do or take nothing.

January 13.—The os was more dilated. I saw her at night, in consultation with her medical attendant. She was greatly exhausted, the dilatation was nearly completed, and the head entering the pelvic cavity. I again advised her to inhale chloroform. She consented, and received immediate relief. She bore her pains quietly, labour made a favourable progress, and she was delivered on the following morning. After the birth of the child, the placenta was retained, but without hemorrhage. I was again sent for, and, finding it adherent, removed it. She was then bandaged and

the bed arranged: she was perfectly tranquil, her pulse good, and I left her much more comfortable than I had expected.

I was greatly surprised that evening (January 14) to receive from her medical attendant an urgent summons to see her. He found her so faint, at his last visit, that he thought she was dying. When I saw her she was gasping, with a pulse (140) scarcely to be felt. There was no trace of hemorrhage—the uterus was well contracted—there was nothing to explain this unexpected catastrophe. She made attempts to tell me something, but failed, and soon after expired. Having been left by her medical attendant in so satisfactory a state, the strictest inquiries were made as to anything that might have occurred between his visits. All we could learn was this. The old gentleman had paid her a visit of inquiry that evening. Some altercation (it was supposed about the fee) took place—the woman fainted, assistance was sent for, and such was the result. Knowing the great amount of pain she had gone through, being in constant pain for four days, more or less, I concluded that it caused a great amount of constitutional exhaustion, and that she was unable to sustain a shock, which otherwise would only have produced its usual amount of irritation. This case may be compared with another, in which constitutional exhaustion was produced in a different manner, but was followed by the same result.

About twenty years ago (1834), a poor pregnant woman walked a considerable distance to the Dublin

Lying-in Hospital. When near it, she was suddenly seized with the pains of labour—dropped down—and was delivered in the street. She was carried to the hospital, and received immediate attention. Nothing dangerous occurred, but her alarm was very great: after some time it subsided, —she slept—and nothing unusual happened until the following day.

On that morning, a patient was brought into the same ward in which she lay, to be delivered. She occupied the next bed to her, and was extremely boisterous. The woman seemed to give no attention to the disturbance. She lay quite quietly; but in the course of the day she felt faint, and complained of being overcome by her neighbour's cries. The woman who caused this was fortunately delivered, and thus all further annoyance was removed, but this patient did not recover from the effect that it produced on her. In the evening, she was seized with an alarming syncope, and died in three hours. A *post-mortem* examination was made, and nothing was found to explain the cause of her dissolution.

In both these cases, the obvious cause of death was the shock given to the constitution previously exhausted; and had the former patient taken chloroform when first recommended to do so, I am satisfied this catastrophe would not have happened, because, the moment she received relief, labour proceeded most rapidly, and the assigned cause certainly would not have produced so severe a shock as it did in her then exhausted state.

This case is quoted more at length because it

clearly demonstrates the effect of long-continued and severe pain on the constitution. I might quote several to prove how much the recovery of the patient is promoted by the removal of severe pain. Experience teaches me that a favourable recovery is the rule after the administration of chloroform. It was so in the first case in which I employed it, and has been so ever since.

I attended a lady with her sixth child, who always had severe labours, being constitutionally intolerant of pain. She took chloroform, and was delighted with the relief it afforded her,—labour was soon concluded, and she recovered rapidly. The same happened in her seventh and eighth confinements. She remarked that, before she took chloroform, "her recoveries had always been slow."

Another advantage applies to cases of difficult labour when the mouth of the womb or the passages are unyielding.

I attended a lady in her first confinement, with whom the os uteri was extremely rigid, so much so, that the whole cervix was forced down into the pelvis before the least dilatation took place: the waters escaped at the commencement of labour. I was apprehensive of inflammation of the cervix and increased delay; the more so because, when the mouth of the womb at length dilated, it did so unequally, the posterior lip expanded, leaving the anterior still before the head. Several unsuccessful efforts were made to remove this impediment, by pressing back the anterior lip. I then cautiously

introduced the forceps, and, acting with the pains, succeeded in getting the head beyond it; but when the head reached the perinæum, it was so unyielding that I was obliged to use increased caution: at length it gave way gradually, and when the head fully occupied the vulva, I withdrew the forceps altogether. The head remained for nearly an hour before it was expelled, and the funis being tightly round the neck, the circulation was so long thus interrupted that the child was still-born.

But throughout this severe labour there was not a trace of inflammation either in the os uteri, vagina, or perinæum. The patient recovered most rapidly, and was out in less than three weeks. In this instance, the lady was of a mature age, and the case may be contrasted with another, which shows how rapidly an unyielding perinæum sometimes relaxes under chloroform.

A young girl, scarcely sixteen, was taken in labour with her first child, which most unfortunately was very large. She had been forty-eight hours in labour; the head was in the cavity of the pelvis, but could not get farther. I was sent for to assist her. The perinæum was not in the least dilated: it was very difficult to make even an examination. Still I had no choice but to apply the forceps, if I could. The first attempt was unsuccessful, because she made so much resistance; however, chloroform was given, and when she was under its full influence, a second trial was made. The perinæum, which was the chief difficulty, soon gave way, and I was able to conclude the labour

much more rapidly and with less difficulty than I had anticipated.

This case is the most remarkable example that I met with, but in numerous instances I have found the difficulties which the perinæum presents completely overcome by chloroform, to say nothing of the intolerable anguish being removed which the patient usually suffers at this stage of the labour.

An advantage also arises from the progressive course that it takes upon the nervous system. There is an order in its action which is worthy the attention not only of the accoucheur, but also of the surgeon. We have explained that the sentient nerves precede the reflex, and the latter the ganglionic in yielding to its influence. Hence it is quite possible so to regulate the dose as to affect the sentient nerves only, and not the rest; pain may be relieved, if not removed, and the intellect remain undisturbed.

Sopor is not essential for the relief of pain. Any one may put this to the test by adopting a very simple experiment. If a small quantity of chloroform (say half a drachm) be dropped on a sponge, which is placed in a folded handkerchief and held before the face at a short distance, the vapour may easily be inhaled. Two or three inhalations may be taken—just sufficient to communicate a feeling of warmth, and if the face or hand be then pinched, the person will scarcely feel it, although perfectly awake and in possession of his senses. The same experiment may be better performed with the inhaler that I use; there is less waste of

chloroform, and there can be no error with regard to distance, when inhalations are thus taken by the mouth.

I have already alluded to a case of mammary abscess which was opened without pain, the patient being perfectly conscious at the time. Since then I had occasion to become myself the subject of a similar experiment, which I shall mention, because it will perhaps best explain my meaning. Like many others at the present season, I suffered from carbuncle on my hand: it was necessary to have it opened. I took about four inspirations from the inhaler, having a drachm of chloroform on the sponge. I then with a lancet cut through the carbuncle, and felt no pain. I did not, however, do so sufficiently. A medical friend, on the following day, repeated the incisions more freely. I took chloroform just in the same manner, and felt no pain, nor was I in any degree soporised.

The obvious conclusion from these experiments is, that the risk from chloroform may be altogether avoided, and yet the patient receive a considerable amount of relief. In the practice of midwifery, the pains of labour can be assuaged and rendered tolerable without inducing sleep; and in the practice of surgery, it appears to me that many minor operations may be performed with equal safety. I might even go farther, and apply the same remark to amputations and such like operations. In these operations, the greatest pain is felt when the skin is being cut through, because it is here that the ultimate ramifications of the sentient nerves are

minutely distributed. Chloroform instantly acts upon them, and blunts, if it does not remove, their sensibility. So that an amputation may be performed on a patient wide awake, and give him little, if any, pain. It is much to be regretted, therefore, that the properties of this anæsthetic are as yet so imperfectly understood. The public, and, indeed, the profession, have no other notion of chloroform but as a soporific;—to give chloroform implies putting the patient to sleep,—anæsthesia is lost sight of,—sopor is the leading idea. Hence it happens that many dread to be put to sleep in this way, more especially as, in some surgical operations, deaths have taken place while the patient was thus soporised. Objections are therefore unnecessarily raised against this agent which a little reflection would at once remove.

If the heads of the medical department in both services were aware that chloroform may be given to relieve pain without exposing our men *to the least risk*, I am persuaded its use would not be prohibited by them. They are well aware that there is a great difference in the amount of pain which the same operation may cause in different constitutions. Soldiers of equal courage in the field do not bear an operation with equal fortitude; the one will smoke his cigar and converse while the knife is dividing his limb; the other is completely overcome by the intensity of his pain. Now, in the latter case chloroform may be given with perfect safety, and if, in place of the cigar, he were given the inhaler, a very few inspira-

tions would be sufficient so to blunt sensibility that he could converse just as well as his companion.

The disadvantages of chloroform arise sometimes from want of sufficient experience in the administration of the vapour; sometimes because of constitutional peculiarity.

Sickness of the stomach has been caused by it. Dr. Snow has observed instances when given for surgical operations. He attributes this irregular effect to a neglect of the condition of the stomach at the time that chloroform is inhaled. "If taken immediately after a meal there is increased liability to vomiting; and, on the other hand, it is not advisable to inhale after a long fast; for when sickness has occurred in this condition, it has been, in some instances of considerable duration, and accompanied with more than usual depression."

I have met only one instance of sickness of the stomach in the practice of midwifery. A lady who inhaled the vapour during her labour without any unpleasant effect was seized immediately after with vomiting. It was easily checked by a few drops of Baltley's solution in brandy and water. I have observed also nausea in some cases which was relieved by ammonia in effervescence.

Headache is another consequence of its use, which sometimes, but I believe rarely, occurs. There are, however, certain conditions of the constitution in which the inhalation of chloroform has been attended with troublesome symptoms. I cannot speak from my own expe-

rience, but I have been informed, that in dentistry, hysterical women have been seized with fits, and men of robust constitutions with temporary delirium in the transition stage from anæsthesia to sopor. Dr. Snow has observed with epileptics, that a paroxysm may take place as the patient is becoming unconscious. Such consequences have been observed when the full dose of chloroform is given for operations either in dentistry or surgery, but I have not met with them in midwifery, nor do I think that they are likely to occur when a moderate dose is given, because loss of consciousness is not required; a small dose is sufficient to relieve pain; the transition stage need never arrive, and if it should happen that peculiar idiosyncrasies, which will not tolerate chloroform, present themselves, any irregular effect is perceived in sufficient time to prevent accident. Hence it is an important rule *never to give a full dose of chloroform in the first instance.*

The objections to chloroform are almost as many as the objectors, who have hitherto formed rather a numerous body. The great majority of them are, however, founded upon false facts, false reasoning, and mere prejudice—a very natural result when we argue rather upon hearsay evidence than our own experience. When a question concerns facts, the only way to determine it is by direct observation, seeing "whether these things are so." Without this, the most elaborate dissertation, the most ingenious reasoning, is only a waste of time and words; neither is such the prac-

tice usually adopted by the inquirer after medical truth. The physician will not hesitate to give hydrocyanic acid, arsenic, and other powerful poisons *as an experiment;* he thus acquires the knowledge of a valuable remedy. The principle applies equally to chloroform, yet we find the chief objectors are those who never do, who never would, use such an agent; who really can know nothing whatever about its properties, but nevertheless will not hesitate to pronounce boldly a most decided opinion upon its merits. Scarcely less excusable are those who profess to found their opinions upon personal observation *after* chloroform has been given. They are summoned to relieve some of the many casualties of parturition which are matters of every day experience, they are informed that the patient inhaled chloroform during her labour, and at once this dreaded agent is asserted to be the cause of all the mischief. Such cases have been absolutely quoted in evidence against its use as coming under *the personal observation* of the objectors. For instance, two cases have been recorded* in which chloroform is asserted to be the cause that rendered the operation of craniotomy necessary! that is, chloroform caused such contraction in the pelvis (no other reason could justify such an operation) that it was essential to destroy the child in order to deliver it!! Such personal observations as these require a careful and discriminating examination in order to appreciate them.

* "Lancet," vol. ii. 1853, p. 608, 609.

The few who have carefully examined the properties of chloroform, whether by experiment on the lower animals, or by personal observation of its effect when administered, have all agreed in one opinion as to its safety when given with judgment, and by those who perfectly understand the nature and properties of the agent they are using. It requires no argument to prove, that a hydrocarbon of such power is dangerous in the hands of those who have no experience of its action, but that experience is easily acquired, and leaves those who would plead ignorance of its properties as a reason for withholding it perfectly without excuse.

The whole of these objections seem to me resolvable into a leading one, which will require careful consideration, and a legion of which it is only necessary to notice their absurdity.

Sudden death from chloroform is a very important objection. The "British and Foreign Quarterly Review," in an able article,* enumerates twenty-three deaths from chloroform; about seven might be added since it appeared. The whole number of deaths which may be depended upon may be considered as thirty. These are collected from all sources where chloroform has been administered; they are all derived from surgical practice, and chiefly occurred in surgical hospitals.

In order to form some estimate of the risk in using this vapour, these thirty cases must be com-

* "British and Foreign Quarterly," No. xvii. p. 158.

pared with the total number in which chloroform has been given. It is impossible, however, to ascertain this, but some judgment may be formed so far as London is concerned.

Chloroform has been administered, I am informed in

St. Bartholomew's Hospital in	4000 cases
In University College Hospital in upwards of	1600 „
In St. George's (I believe)	1400 „
I do not know the number in King's College, Guy's, St. Thomas', the London, the Middlesex, or the Westminster Hospitals; but if we say	2000 „
For the whole, this would make a total of	9000 „

About nine deaths have been reported in the London Hospitals, and it is probable that the proportion is the same elsewhere. The deaths may, therefore, be considered as one in a thousand, and if we reflect on the great power of this anæsthetic, that it is only just introduced into practice, and cannot be as yet sufficiently understood: that for the purposes of a surgical operation the patient is brought under its full influence and exposed to risk, if by any accident the quantity be increased or given too rapidly, it may be admitted that the proportion of accidental deaths is not large. If, further, it is considered, that in most of them disease of the heart previously existed, so as to render it doubtful in some instances which was the true cause of death,

chloroform or the disease, we shall not be alarmed at this mortality.

They are important, however, in shewing the way—*the only way*—in which chloroform becomes dangerous and may be fatal. The manner of death is uniform in all. It was sudden; with or without a struggle, the face was blanched, the head dropped, the pulse was gone, and generally in less than five minutes the patient was dead. It was evident that death commenced at the heart, its action being controlled by too concentrated a dose. In many of these cases the heart was softened, fatty, and it is possible that an ordinary dose would paralyse it if given too rapidly, but if given very gradually I do not think it would do so. Dr. Snow, who has given this agent so much of his attention, "cannot conceive how a moderate and gradual inhalation of chloroform should cause any person's heart, however diseased, suddenly to cease beating, there being neither facts nor analogies to support such an occurrence." Such is the manner in which chloroform is fatal; there is not in the whole range of surgical practice an instance of death from chloroform some hours or days after its administration, such phenomena belong exclusively to the practice of midwifery.

Dr. Ramsbotham relates "a deplorable case of death *after* the exhibition of chloroform vapour during labour".* "It was the lady's fourth child, she gave birth to the first *after a very tedious and painful*

* Ramsbotham's "Obstetric Med. and Surgery," p. 169.

labour, in consequence of a considerable narrowing in the conjugate diameter of the pelvic cavity, which rendered the use of the long forceps necessary. This was before the application of anæsthetic agents to the practice of obstetrics was adopted in England. Her medical attendant (not Dr. R.) at her urgent request placed her under the influence of chloroform during her second labour, and *her recovery was speedy and perfect.*"

It was exhibited in her third confinement also; but, in consequence of some unfortunate results having occurred, more sparingly than on the former occasion. "She was harassed by pains in the head, vertigo, and wakefulness, for four days after the child's birth. Attributing the distress she then suffered to the inefficiency of the dose, when again pregnant she entreated that in her labour it might be given with sufficient freedom to insure its perfect effect."

"Parturient pains came on about noon. Chloroform was given at half-past seven P.M., when the os uteri had acquired the diameter of an orange, and the pains had become frequent and strong. Its effects were most delightful and tranquillizing. *After refreshing sleep, she rose and bore some moderately strong pains without a return to chloroform.* It was then resumed and repeated in frequent drachm and half drachm doses, *but only when she intreated to have some of the delightful chloroform*— from about ten to a quarter to twelve, soon after which the child was born. She *instantly* expressed much gratitude, and expatiated on the relief

afforded, though she even then 'felt wrung' by the severity of her labour. The uterus contracted well, and *the patient appeared comfortable.* At the end of an hour and a half, however, *distressing dyspnœa* came on; this was soon followed by convulsions, and almost immediate death."

Such is the account of this deplorable death from chloroform. Let it be compared with those that have occurred in surgical practice, and a judgment formed of the accuracy of this conclusion. The lady referred to never lost her consciousness. Chloroform never caused her the slightest inconvenience during its inhalation, her respiration was perfectly undisturbed. After delivery *"she instantly expatiated on the relief afforded her, was quite collected, quite comfortable." But in an hour and a half afterwards,* when all the chloroform inhaled (and she had evidently taken very little) had quite time to evaporate and disappear, she is seized with a distressing dyspnœa! an effect the very contrary to what chloroform is known to produce; *convulsions* and death follow.

We would ask, how could the absent vapour cause a distressing dyspnœa, when its presence did not disturb the respiration in the least degree? If chloroform cause distressing dyspnœa, why not do so during its inhalation? or, if such be its effect *after* inhalation, how is it that we cannot find a single instance of death so produced in the thousands who have been under its influence for surgical operations?

A moment's reflection is sufficient to shew the

injustice of attributing this fatality to chloroform, simply because no other explanation could be given. It is to be regretted that no *post mortem* examination had been made before so absolute a sentence had been propounded. This is not the first recorded case of *unaccountable* sudden death after delivery; and, inasmuch as in some instances the cause has been traced, and the admission of air through the uterus into the veins has induced death with very similar symptoms, it would have been desirable that the absence of every such cause should be known, before one is assigned which the well-known mode of action of this vapour proves to be impossible. I feel the more convinced of this, because a very similar case came under my own notice which is published in my Lectures.* A *post mortem* examination was made, the kidney was found extensively diseased; in that condition which is the well-known cause of puerperal convulsions; it appeared to me a question, whether the dyspnœa, which was present, may not have been a form of such convulsions, which, had the patient been exposed to the full force of her pains, would have engaged the nervous centres more distinctly. The blood was carefully analyzed; but no trace of chloroform could be detected, proving that it did not incorporate with the blood. This is the only assumption on which it is possible to attribute to this vapour

* "Lectures on the Principles and Practice of Midwifery," p. 474.

effects occurring some time after its inhalation. These cases are certainly instances of death *after*, but not *by*, the administration of chloroform; and one of them, at least, is an instructive example of the promptitude with which the catastrophe is attributed to this ill-omened vapour.

Death by chloroform, I believe to occur *only* when the patient is under its full influence. A woman in labour never requires such a dose; consequently, there is no risk, and its administration becomes perfectly safe.

If we have disposed of this—the leading objection to the use of this anæsthetic—those that remain are of little importance; we shall select a few as examples of the rest.

Drunkenness is one of the charges brought against chloroform. The distinguished author to whom I have just alluded, observes,—"Those who come forward as the chief advocates for anæsthetics under labour, have entirely denied, or maintained an undisturbed silence respecting its intoxicating properties". And again,—"But if the case were put fairly and honourably before them (the candidates for chloroform); if they were informed that they might probably be made *dead drunk*, but must certainly be reduced to that condition which the law designates 'drunk and incapable,' how many, it may be asked, of our high-born dames? How many women possessing common feeling? How many, indeed, removed above the very lowest orders of society would be found to avail themselves of the immunity of suf-

fering which anæsthetics hold out, at such a price, at such a sacrifice of moral obligation?. . . . . I must repeat emphatically, that this state is not sleep but *drunkenness*."*

I must be equally emphatic, and repeat, that the anæsthesia of chloroform has not the least resemblance to drunkenness, they have not a symptom in common. Alcohol mixes intimately with the blood, chloroform does not. The one is highly stimulating, the other not at all so. Alcohol has no anæsthetic power, unless taken in very large quantities, when the imbiber, after a stage of most boisterous excitement, arrives at the condition termed "dead drunk", the anæsthesia of alcohol. Chloroform manifests this power without the least excitement: it produces anæsthesia, and takes away pain *without disturbing the intellect in the least degree*. The patient is perfectly herself; and, in the words of Dr. R., can "expatiate on the relief afforded her."* If chloroform cause sopor, the sleep is perfectly tranquil, the only evidence of excitement (if such should happen) being the occasional mutterings or ramblings in the transition from wakefulness to sleep. The effects of alcoholic potations do not pass away for hours afterwards, because time is required to separate it from the blood. Chloroform is not so dissolved, and therefore rapidly evaporates, leaving the patient in much less than an hour as much herself as before she inhaled the vapour. Conse-

* Ramsbotham's Obstetric Med. p. 180.

quently, this animated exhortation to high-born dames against drunkenness, becomes quite irrelevant so far as chloroform is concerned.

Violence to the person, for the purposes of robbery, felonious assaults, etc., etc., are among the charges against this agent. It is said that men have been robbed by its means; but then they had been *previously drunk.* Among the obscene publications that emanate from the purlieus of London, are found histories of assaults on females successful through its means. A very remarkable case of abduction took place in an Irish county celebrated for its crimes. An attempt was made to take by force, a lady of the highest respectability, as she was leaving church. Guns, pistols, bludgeons, were found in case of resistance, and among them a chloroform bottle to relieve hysterics!

If it were possible to employ this agent in the manner such statements would lead us to believe; if a man or woman could be brought under its full influence against their will, there could not be a stronger reason for prohibiting its use. But I believe this to be impossible, because it is necessary to do so quickly, and whenever the attempt has been made on man, or on the lower animals, to bring them rapidly under the influence of chloroform, there has always been the strongest resistance to inhale the vapour; the excited spasm of the glottis, the sense of suffocation is so great, that every effort is made *not to inhale.* If such then be the case when the object is to benefit the

person, what would be the resistance if the intention were otherwise.

The only case in which I could suppose that the assailant might succeed, would be when the person had been previously "drunk and incapable." Here, of course, chloroform would more rapidly complete what alcohol had begun.

The agency of this vapour must therefore be looked upon in the same light as poisons generally. It may be made the means of accomplishing a crime, but only when the person is by some other means deprived of his or her power of resistance.

Insanity is an affliction strongly insisted upon as a melancholy consequence of the administration of this vapour. This assertion, however, must be understood, not in a general but in an obstetric sense. Thousands have taken chloroform; and, if insanity were the result, the lunatic asylums would be filled with the mutilated who have been soporized for surgical operations. Such, however, does not appear to be the case; it is only the parturient female that chloroform seems to select as its victim; with them alone it causes insanity and great disturbance of the brain.

Unfortunately for this assertion, puerperal mania is the well-known affliction to which the parturient female is liable, altogether independent of chloroform. This malady is produced by many causes which then come into operation, and has occurred from time to time since midwifery was practised; it remained, however, for the opponents

of chloroform to open new views on the subject, and to discover the true cause of these aberrations in this mischievous vapour.

It would be a waste of time to argue this question, I shall only state my own experience. I have administered chloroform in upwards of a hundred instances, a number sufficiently large to form an accurate opinion on such a point; I can truly say, that in not a single case was there the slightest approach to mental aberration. Could this happen, if insanity were one of its effects? How is it possible for so many women to escape the noxious influence of this anæsthetic, if such were a consequence of its inhalation.

I have not, as yet, met with an instance of mania *after* the administration of chloroform, although it is quite possible that I may do so, when the usual causes of this disease come into operation to produce it. I once attended a lady (the wife of a medical friend) to whom had I given chloroform I should certainly have been very much blamed. She suffered rather severely, I proposed the inhalation of this vapour; my friend, however, objected, as he feared, from some peculiarity in her constitution, that it would not agree with her. She went through her labour, and after a severe trial was safely delivered. On the tenth day symptoms of mental aberration manifested themselves, which continued for some time before they disappeared. Had she taken chloroform it would be very difficult, indeed, to have convinced my friend, that these symptoms were not

a confirmation of the great disturbance of the brain which this agent has the reputation of producing.

It would be needless to notice phlebitis, peritonitis, hemorrhage, convulsions; in fact, all the casualties of parturition, every one of which, according to some writers, are caused by chloroform. If we were to believe all that is said, not only is this anæsthetic made responsible for every accident that may happen during or after labour, but there is scarcely a crime that it has not committed. Not only is it the cause of puerperal fever and craniotomy, but this reckless agent has broken through all laws, divine and human. It abrogates the curse, it causes drunkenness, assists the robber and the violator, and commits homicide, a catalogue of evils quite sufficient to insure its expulsion from practice.

The reader, however, may perhaps suspect that this hostility is too zealous; that the accusers are proving too much; that the picture is overdrawn; and that the question is worthy of a fair examination; that it is neither to be determined by *à priori* reasoning, nor by implicit credence in every reported fact. He may be disposed to form his own opinion, from personal observation, from direct experiment. If so, I have very little doubt as to the conclusion to which his inquiries will lead him. I shall be too happy if the following rules may give him any assistance in the application of this agent, and would only intreat him to recollect the power of the hydro-carbon he would

use, that it is not like aromatic vinegar, or smelling salts, which may be given, or inhaled, without any instruction.

Rule 1.—Let chloroform be pure. If rubbed on the hands the smell should be fragrant, not pungent, like sulphuric æther. If inspired from the inhaler, there is a sense of warmth in the mouth, a fruity flavour, no pungency; if the strength of the vapour be sufficient it will excite slight cough, but if impure, the cough is irritating.

Let the sponge of the inhaler be placed in warm water, and then rung perfectly dry. About thirty minims may be poured upon it, which is sufficient in the first instance.

2.—When labour has commenced, do not interfere so long as the patient bears her pains well; if she be not teased with short, very severe, and inefficient pains, chloroform need not be given. If, on the contrary, the severity of the first stage be such, the anguish of the patient so great that pain is evidently a cause of protraction, chloroform may be given with great benefit.

3.—Always commence with a small dose, about thirty minims; if it agree with the patient no inconvenience is caused, but she will generally complain that it is doing no good; the quantity may then be increased until, on inhalation, the exhibitor finds he cannot take a full inspiration without cough.

4.—In the second stage of labour, chloroform may be given when the head is approaching the perinæum, or before then, if the pains become intolerable. This may be known not merely by their greater intensity while the uterus is in action, but also by the restlessness of the patient in the intervals. She is watchful,

dispirited, still crying, but in a more subdued tone from pain and a feeling of soreness.

5.—When the head arrives at the perinæum, chloroform may be given in a fuller dose, if it have not already accumulated. The perinæum yields more easily under its influence, and the severity of the pain is controlled without any loss of force.

This rule applies especially to cases in which powerful forcing pains are acting against the perinæum at the hazard of its laceration.

6.—When operations are necessary, if they are not severe, as for instance, some forceps operations; chloroform may be given in the same manner as in natural labour; but always after the instrument is applied.

If severe, it may be given as in surgical operations, but not to the same extent. Hence an assistant is necessary, who is quite conversant with the properties of this anæsthetic. It is obvious, that the same person cannot operate and give, simultaneously, the full soporific dose of this agent.

7.—The inhaler should be applied to the mouth, just before the pain commences, two or three full inspirations taken, and the moment the action of the uterus ceases it should be withdrawn. The inhaler should never be applied in the interval between the pains, and if used in the middle of a pain, the cries of the patient blow away the vapour and no relief is given.

8.—When inhalation has been continued in this interrupted manner for some time, if any alteration be observed in the countenance or manner of the patient; if the face is flushed, or bloated, or tinged with a slight lividity; if she ramble, or become hysterical, let the inhaler be withdrawn, and the face of the

patient fanned. Wait until the pains return to their original severity before renewing the inhalation, when it is probable that these symptoms will not return.

9.—In some instances, the patient is very intolerant of her pains, and if given chloroform to relieve them, she becomes hysterical, crying, perhaps, louder than before it was inhaled. In these cases, it is better to induce sopor, which may easily be done without stertor. For this purpose a sponge and folded handkerchief applied to the nostrils is preferable to the inhaler. Whenever sopor is brought on, the closest attention should be given to the countenance—observe the irritability of the eyelids; to the respiration—notice its frequency, and especially stertor; to the pulse—mark its strength. The handkerchief should always be held at a distance at first, and be gradually brought nearer, but the sponge should never be applied quite close to the nostrils.

10.—There should be the freest circulation of air in the apartment: and if, after delivery, there should be any feeling of faintness or nausea, ammonia in effervescence will relieve it.

By ordinary caution and attention to these rules, chloroform may be administered with *perfect safety* in the practice of midwifery. The practioner who ventures upon its use will soon be satisfied of its *great advantage,* not only in very severe cases, but even in many of the ordinary cases of natural labour.

I would only ask him, in conclusion, to disregard the idle rumours with which he may be surrounded; to disengage himself from preconceived notions about an agent that he has not

examined; but, as is his duty, to study the properties of the anæsthetic proposed to him; to try *by experiment* whether the statements respecting it are correct; and, in fact, to *judge for himself*, "whether these things are so."

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