ON DEATH FROM CHLOROFORM.

By THOMAS GREEN, F.R.C.S., M.D. EDIN.,

Consulting Surgeon and late Senior Surgeon to the Bristol Royal Infirmary.

DEATHS from chloroform have lately been more frequent than at any former period. If this death-rate continue, the public and the profession may consider this agent, with all its benefits, to be, after all, a fatal boon.

When inquests have been held in such cases, the public are informed that "all the usual means were tried, and failed"; and with this information they must rest satisfied. But there are others deeply concerned, who require more than this—namely, the profession at large, who may be called on any day to administer this deadly agent. They have a right to have before them a full and precise account of everything that happened—the manner in which the anæsthetic was given, the symptoms which preceded death, and the way in which death occurred; a precise account of the remedies used, and when and how they were used. The profession ought to know what was done and what was not done, not from mere scientific curiosity, but as a guide to enable them to be prepared beforehand to use at once those means which experience has found successful in similar cases, so as to avoid the panic and confusion which prevail when those around are not prepared for the fatal event, and thus not to lose precious moments at a time when life literally hangs on seconds. The remarks which have been made in the BRITISH MEDICAL JOURNAL (October 5th), state most truly what is required from those who have to do with a fatal case of chloroform: "We hold it to be the serious duty of every practitioner, in whose practice a case of death under the influence of chloroform occurs, to place on record all the details." Recent events imperatively call on the profession most carefully and impartially to receive everything in the way of prevention, and to strain every thought, so as to lessen, if possible, this heavy mortality from chloroform. This is the more necessary, as there is reason to fear the existence of a feeling in the minds of some that a given proportion of deaths must follow the use of chloroform (say 1 in 2,500, as stated by Dr. Richardson). This feeling may extend so far as to lead to the conclusion that a death *must* now and then occur; and, the proportion being so small, and the benefit so great, that no heavy calamity happens in an occasional death. Some may so think; but I feel assured that they constitute a minority in the profession, and that the majority look upon these so-called accidents as calamities which ought to be by all possible means averted. It cannot also fail to be observed that some change has taken place in the manner of reporting these cases in the medical journals. Formerly, when a fatal case was recorded, attention was directed to it in the table of contents at the beginning of each number; now we see nothing of the kind. The cases are mentioned *en passant* in the proceedings of the week. If we happen not to look through these, we may know nothing about them. This *laissez-faire* way of dealing with a most serious matter, if general, could only paralyse every attempt to lessen the evil. To admit that a certain proportion of deaths from railway accidents must occur, would be a deplorable error, and could only prevent everything from being done to obviate them. Equally deplorable would it be in dealing with accidents from chloroform, and attended with the same results.

I have recently published (BRITISH MEDICAL JOURNAL, May 25th, 1872) some cases which occurred in the Bristol Royal Infirmary, where instant faradisation was remarkably successful in restoring animation when suspended by chloroform, and under circumstances similar to those of recent occurrence. I have to add to them another case since recorded by my friend Mr. Morgan, which also occurred at the Bristol Royal Infirmary, and at which I was present. (BRITISH MEDICAL JOURNAL, June 1st, 1872.) In this case, the success of the electric current was as marked as it could possibly be. Mr. Morgan writes as follows. "His pulse stopped, and he seemed *in articulo mortis*. Instant recourse was had to the electro-magnetic battery, and almost as instantly the pulse returned, and the man was safe." This case, added to those which I have reported, makes seven, in each of which the heart suddenly stopped after the administration of chloroform, the patient appearing dead; and, with only one exception (Case 11), its motions were as instantly restored by faradisation, and life saved in each of them.

It may be asserted with confidence that there is not, in all that is recorded concerning chloroform, so strong a body of evidence in favour of any other means to save life after its use, as there is in favour of instant faradisation. I might have felt less confident as to the value of this evidence, were it not that I have had assurances from competent

judges in the profession, both in these countries and in America, that the cases I have recorded amount to a demonstration that the electric current, so applied, is the most powerful agent known to restore animation when suspended by chloroform. If this be true, it may be asked, is it right, in cases where the heart suddenly stops, to waste precious moments with such frivolities as drawing out the tongue, etc.? The facts related are in themselves sufficient to carry conviction; but that conviction becomes more certain when we consider what electricity can do—that it is "the most powerful agent with which we are acquainted for exciting muscular motion even after death". The heart being a muscular organ, what better means do we possess of restoring its motion, when entirely suspended, than the most powerful excitant to muscular motion that we know? When the natural vital motions of the heart suddenly cease, what better than the best artificial vital excitor we know to restore them as suddenly? Can anything else in Nature do it as surely and as quickly? The question must cross the mind, Is it right persistently to ignore evidence of this kind? Those who do so may incur a heavy responsibility. It is little better than rejecting the most important evidence in a trial where life is at stake. When inquests have been held in any of the recent cases, the public are simply told that "the usual means were tried and failed"; they ought to be informed what those means were. Without this information, there is little or nothing to be learnt from such statements.

Amongst the most recent deaths, we find that, in the last week but one of August, two happened in London. One was in the Great Northern Hospital, and a short account of this case is given in the journals. We are told that the "efforts of all were unavailing to restore consciousness". Do these last words mean to save life? because consciousness may be gone and yet life remain. Further details will of course be published. When they are, the public will know what those means were. The day before, a death occurred in the private house of an eminent surgeon in London. I have not seen any notice of this case in the weekly journals; no details are as yet published. About the same time, a death from methylene occurred in the Bath Hospital (BRITISH MEDICAL JOURNAL, August 31st, 1872). An inquest was held. The remedies used were the following. "The tongue was drawn forward, ammonia was given, and the galvanic battery was used for three-quarters of an hour, but without any effect." Three fatal cases in one week from anæsthetics is a heavy death-rate.

Since that time, a death has happened at Brighton. An old lady, aged 70, "died suddenly when very little chloroform had been given." (BRITISH MEDICAL JOURNAL, October 3rd, 1872.) As yet, there is no further report.

About the same time, a death occurred in the London Hospital, and is reported by Mr. Mackenzie (JOURNAL, October 5th.) Three drachms had been administered. The gentleman in charge of the pulse said, "He has lost his pulse." "Artificial respiration (Silvester's method), galvanism to the heart, frictions, and brandy enemata, were in immediate use, all without effect."

Soon afterwards, a death occurred in the South London Ophthalmic Hospital from chloroform (BRITISH MEDICAL JOURNAL, September 18th, 1872). The report tells us "it soon became manifest that the heart had ceased its action. Means were taken to restore animation, but without avail."

Next, we find a death from methylene at the Middlesex Hospital. Two drachms were given, when it was noticed that the breathing had ceased. Silvester's method of keeping up respiration was at once resorted to, and the patient gasped once or twice; galvanism was employed, but without any effect.

Next, a fatal case is reported from the Nottingham Hospital by Dr. Marshall (JOURNAL, October 12th). Three drachms had been employed; "suddenly his face became pale, his teeth firmly fixed, and respiration ceased entirely; galvanism and artificial respiration were resorted to for thirty-five minutes, but with no effect."

About the same time, another fatal case is reported by Dr. Bird of York; two drachms of chloroform had been administered; "within a minute after this the pulse suddenly stopped," "cold water was dashed on the face and chest, the tongue drawn out by forceps, and artificial respiration (Silvester's method) adopted," "but the case was hopeless." The last three cases are reported in the BRITISH MEDICAL JOURNAL, October 12th, 1872. The profession is much indebted to the BRITISH MEDICAL JOURNAL for recording those cases, and thus bringing them under the notice of the public; this is the more necessary, there being reason to fear that too many fatal cases are never made known to the public. Deaths so frequent from an agent which we employ demand, and must receive, the most serious attention that can be given. There may be some who think that so many fatal cases in so short a time merely signify that the average number of deaths is concentrated in a shorter period than usual; but sure am I that a ma-

majority of the profession thinks that human life is a thing too sacred to be lost, because those who administer a deadly drug underrate its danger, or think that a certain number must die from its use, or that, when the heart suddenly stops, the case is hopeless; and hence are unprepared by prompt and energetic action to save life. A review of these cases, together with a large amount of former experience, can lead to but one conclusion, that Professor Lister's teaching, to "disregard altogether" the pulse, is a fatal error. It appears, from a recent clinical lecture of Mr. Erichsen, that he thinks, when the pulse suddenly fails, the case is all but hopeless; that, in "cardiac syncope," the patient dies. He is right to a certain extent. Death too surely follows, unless means very different from those hitherto used be instantly resorted to. It is probable that Mr. Erichsen had not seen the account of those cases which I have published when he gave his lecture; if he had, he would have known that life has several times been saved under circumstances which he thinks all but hopeless, and by a remedy which he does not even mention by name.

From the reports of all the recent cases, it is evident that a sudden stoppage of the heart's action was followed by death; and that the "usual means" were not sufficient to prevent a fatal occurrence. It may be said that electricity was employed and failed, as well as other means; but the all important question arises, Was that powerful agent used in the manner in which it has been attended with such marked success in similar cases? When suspension of the heart's action is sudden and complete, death can only be prevented by the most rapid and energetic action, and for these two qualities we must look to electricity; no other agent, no other mode of employing any other agent, approaches electricity in these two essential qualities. In addition to its direct effect on the heart, it may be that electricity excites and brings into play the respiratory muscles; this action materially assists that of the heart, and may perhaps enable it to act where in some cases, without this aid, it would be unable to expel its blood.

To give full effect to this potent agent, it is necessary to be prepared for immediate action; the battery should be in the operation-room, ready for use at a moment's notice; and the moment the heart ceases to beat, the battery should be instantly employed, and as instantly the heart begins to beat again. This is the experience derived from six cases at the Bristol Infirmary; and the facts cannot be disputed. No disbelief, no want of confidence in the remedy, no prejudice, nor obstinacy can alter these facts. To attempt to save life, when the pulse is suddenly and entirely gone, by such frivolous proceedings as drawing out the tongue, etc., is only to lose precious time. The tide of life is ebbing too fast to be arrested in its course by such means.

If fatal cases from chloroform continue to occur as lately, some other anæsthetic less dangerous must be sought for. There is abundant evidence to prove that ether is far less hazardous to life than chloroform: the evidence from America is strong in its favour. An American physician, Dr. Jeffries, in a recent visit to England, endeavoured to prove this to the profession in this country, and has given his experience in England in the *Boston Medical and Surgical Journal* for October 1872. From France, Dr. Diday of Lyons, in strong and earnest language, enforces the same opinion. In a pamphlet lately published in Dublin by Dr. Morgan, the facts and opinions collected by him are conclusive as to the dangers of chloroform and the safety of ether; they must remove all doubts from the mind; and, for myself, I feel so convinced as to its superiority, that nothing shall ever again induce me to give chloroform. One death in 23,000 from ether against one in 2,500 from chloroform (if there be anything in statistics) is a startling difference, and may to some extent be accounted for when we know that chloroform depresses the heart's action, while ether stimulates it. This is all important when we are told, on high authority, that "cardiac syncope" is mostly followed by immediate death. Ether produces a deep sleep, chloroform a deeper still; but too often it is the sleep of death.

To those who will still give chloroform, a word of caution as to the preparatory means which should be employed previous to its use may not be entirely useless. All those who have seen semi-solid food gurgling in the pharynx, during the administration of chloroform, must have felt in dread of its passing into the trachea and so causing death; hence, all agree that food should not be taken for some hours previously; but, with such a depressing agent, is it well to encounter vital power depressed by the absence of all nutriment? I have thought not, and for some years have always given about half-a-pint of strong beef-tea and three or four ounces of brandy about two hours before the operation. If given in this way, nutriment and stimulant have passed into the system before the time of operating; little, if any, remains in the stomach to be rejected. In private houses, beef-tea may not be always ready, but eggs and brandy are; these answer the purpose equally well. I have occasionally found that this preparation makes chloroform unnecessary; the patient, when on the table, has left it to me

to give it or not, as I wished; I need not say that, having seen two deaths from its use, and wishing not to see a third, I decided not to give it; the operations were borne without much pain.

In a future paper I may attempt to show that from four to six ounces of brandy, given before an operation, are an efficient anæsthetic. I have taken off the limb of a drunken man, injured beyond all chance of recovery, and he hardly knew what was being done.

THE ADMINISTRATION OF ETHER.

By G. EVERITT NORTON, M.R.C.S., Chloroformist to the Middlesex Hospital.

IN accordance with a wish expressed by the Editor of the *BRITISH MEDICAL JOURNAL*, I have for the last month administered ether in hospital and private practice, in place of chloroform, in all those cases in which it has been possible. I do not, however, quite see my way to administering it in operations when the mouth or nose is involved, as in administering ether it is necessary to keep the mouth-piece closely applied—not so with chloroform. I commenced administering ether according to Dr. Joy Jeffries's plan (a towel in the form of a cone and a sponge); but, before the operations were completed, the theatre became full of ether, and the amount used very large. I now use an inhaler made for me by Hawksley of Blenheim Street, of which the following is a rough diagram and description.

The apparatus consists of an application of one of the principles employed in Dr. Smith's carbonic acid apparatus (*Philosophical Transactions*, 1859-61), by which a current of air is made to travel over the largest amount of surface in the smallest compass. A metal box (A B), measuring 7 × 4 × 3 inches, is divided into six compartments by means

of five metal shelves (the side of the box is represented as removed in the diagram to show this arrangement). Each shelf has a perforation in the middle two inches in diameter; and the shelves at alternate ends of the box are so perforated that each compartment has a free air-communication with the other, and the last one with the outlet-pipe (M). Each shelf and the floor of the box are covered with thick flannel, excepting at the alternate ends of the shelves, where the holes are left uncovered. The box is surmounted by the glass reservoir (H), having a capacity of six ounces, and graduated to drachms, etc., at its side. This reservoir has two stopcocks—one beneath the glass-funnel for receiving the ether, and the other governed by the short lever (R) for admitting ether into the metal box, either in quantity instantly, or slowly and sufficiently for the purpose of the administrator: D is the valve admitting air into the compartments of the metal box; M is the outlet-pipe, communicating by a long elastic tube with the face-piece (K). This latter is after the usual model called "Snow's," and has an expiratory valve at N, and a revolving shutter (L). The latter allows the patient to inhale air without removing the face-piece.

The action of this apparatus is as follows. The two stopcocks of the reservoir (H) are opened, and, say, two ounces of ether are allowed to flow into the box. The fluid, on passing through the top of the box, falls on a round metal plate, an inch and a half in diameter, fixed exactly over the large middle perforations of each shelf. The use of the plate is to at once distribute the ether over a larger surface than could be done were it to fall direct upon the flannel from its pipe. Whilst the top shelf is being saturated, the ether has penetrated the flannel through the middle of the shelf and fallen upon the next shelf, and so on, until in about five seconds the two ounces of ether have been distributed over the six surfaces of flannel contained in the box. Here it will remain without escaping until the inhalation commences. On making an inspiration, the valve (D) falls; air follows along the surface of the shelf as far as the row of perforations, shown at E. Passing through these, it returns beneath the first shelf and down