Clinical Researches

ON

CHLOROFORM.

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CHAPTER I.

HITHERTO the administration of chloroform in operations has been directed in the following manner:—A patient is about to be operated upon; the surgeon and his assistants, with apparatus, are ready; every one is at his post. The inhalation being performed, the time to begin the operation differs according to the opinions of the surgeon. Those who fear beyond measure the effects of anæsthetics commence as soon as they have satisfied themselves of the insensibility of the skin by pinching, and if the patient struggles, he is restrained. Besides, amongst surgeons who operate before having brought their patients to the state of “collapse,” some suspend the inhalation, whatever may happen, if once insensibility of the skin has existed; and some continue it even after having commenced the operation; but another, whom the daily practice of giving chloroform has rendered more confident, gives it at the first onset until “collapse” is produced, and does not commence his operation until this condition is perfectly established.

These two methods appear to us defective, though not to the same degree, nor in the same manner, but both possess disadvantages which it would be useful to remove from practice. Let us examine rapidly in what they consist.

The surgeons who operate upon the first indication of cutaneous insensibility have assuredly the advantage in not compromising themselves much, with regard to the possible dangers of chloroform; but, in reality, do they derive from their method the real and great advantages of this agent? We think not. They limit themselves to a mere demonstration, without results worth obtaining. To cause a patient to inhale (as if to satisfy one's conscience) a few drops of chloroform, and then to tell him, who throughout the operation has not ceased to struggle and cry, that he has not experienced the slightest pain,—is that, indeed, a part which the surgeon can accept? Let us act more seriously. If we have not sufficient confidence in chloroform, let us plainly refuse it to our patients; but from the moment that we do grant it to them, let it be done so as to ensure its full advantages. Employed otherwise, chloroform in our eyes is nothing more than a deception—a palliative which, it is true, takes away the preliminaries, always dreaded, but which has the inconvenience of exciting a state of agitation and inordinate movements likely to compromise the skilful execution of the operation.

Those who do not operate until collapse is complete expose their patients to serious dangers. On the one hand, the anæsthetic collapse is something so far removed from the normal conditions of life, that, in a physiological aspect alone, there would be room for most legitimate apprehensions, even if unfortunate facts had not still further justified them. On the other hand, if the patient be in a state of perfect collapse, however strong may be the faith of the surgeon in the innocuousness of chloroform, it is very difficult for him not to occupy himself at times with the general state of his patient, and to confine himself entirely to the operation which he performs, more particularly if his assistants are inexperienced. There is then a division of thought in what requires undivided attention. Our strictures upon the two methods of administration spoken of above are summed up thus: as to the first, insignificance, and as to the second, danger undergone by the patient, and distracted attention on the part of the operator. It is not thus that we understand the employment of an agent so useful as chloroform, and which, in spite of accidents, is nevertheless an acquisition to good surgical practice.

One word simply upon these accidents, which, relatively to

the very frequent use of the material, are excessively rare. The accidents from chloroform will no more cause it to be discontinued than the accidents upon a railway will put a stop to the use of that valuable means of transport. When immense and numerous advantages are due to an invention, it is not in the nature of man to renounce it at the sight of some inconveniences which are attached to it.

I will here describe in a few words the manner in which chloroform is administered in my own practice.

1st. I employ a sponge tied up in one of the corners of a square napkin. The sponge should be of a middling size, half as large as a man's fist; if smaller it continually requires fresh moistening; if larger it produces too abundant an evaporation, and the proportion of atmospheric air which mingles with the anæsthetic vapours becomes relatively insufficient. The napkin, which contains the sponge in its knotted corner, covers up the patient's eyes, so as to hasten and facilitate the anæsthetic stupor. It prevents also too large a proportion of air mingling with the vapour of chloroform.

2nd. The patient is placed in a recumbent posture, unsupported by bolsters or pillows, it being indispensable in my opinion that the horizontal position should be completely maintained.

3rd. The patient should always be surrounded by a sufficient number of assistants, to put down all agitation, and keep him still, whatever he may attempt to do. We avoid in this manner the irregular and violent motions that might produce a fainting fit.

4th. During the first inhalations, the sponge is kept at a distance, and then brought closer by degrees, with all the precautions that the case may require. I then concentrate my whole attention on the symptoms which reveal the degree of anæsthetic action: the following are the sources of information to which I apply:—

A. The state of the pulse.

B. The state of the respiration, appreciated by inspecting the epigastric region, which expresses in a far more significant manner the state of that function than the costal walls of the thorax.

C. The patient's face, which by its sinister expression often indicates the approach of danger, long before the respiration and pulse have caused any serious apprehension.

D. I attend with particular care to the last manifestations of the period of agitation, and the first appearance of the state of collapse. At this moment I immediately remove the sponge, and wait for the stage of “tolerance.” Lastly, when this stage is fully established, on the slightest manifestation of returning sensibility, I give the patient small quantities of chloroform by means of the above-mentioned apparatus.

This, then, is the manner in which I proceed, and these are the means by which I seek to obtain, before operating, what I call “anæsthetic tolerance.” The inhalation is commenced with all due caution, and when the period of agitation arrives I allow it to pass off, without suspending the inhalation until the patient arrives at the state of collapse. As soon as this is manifested I suspend completely the inhalation. I wait until the respiration and pulse become regular, and until the patient is plunged into that peaceable sleep which in many persons succeeds to the first stages of anæsthesia. This sleep—with perfect regularity of the great functions; with decrease in the number of pulsations; with complete equilibrium of the respiration, which is deep and calm,—constitutes for me the state of anæsthetic tolerance.

I can affirm, from having experimented a great number of times, that when the patient has arrived at this state he is subject to no kind of danger, whatever may be the time during which it is prolonged. It is to be remarked that in this state the general insensibility and muscular resolution are present almost in the same degree as in the period of collapse. But when the “tolerance” exists, sensibility will revive, if we do not take, in this respect, particular precautions. And it has been observed that, in patients arrived at this state of almost saturation, very small quantities of chloroform, in doses incapable of bringing on any accident, suffice to sustain the anæsthesia, without disturbing, in anyway, the state of “tolerance” in which the economy is plunged. We have, then, every kind of security that we can wish for: first, against pain, complete insensibility; secondly, against dangerous functional disturbance, perfect regularity of the functions. And besides, the surgeon, exempt from all anxiety on the score of the anæsthesia, can give himself up entirely to the operative department.

This state of “anæsthetic tolerance,” unfortunately, is not always as easy to obtain as one might believe; there are subjects whose constitution is, in some manner, opposed to it. It

would seem that we can only obtain from them excitement or collapse, and that the medium state, which constitutes essentially "tolerance," cannot be produced. They commence, as do nearly all subjects, by excitement, and arrive at collapse; but as soon as this is about to finish, it gives place to new excitement. It is only in children, in certain women, or in adults very debilitated, that we pass from the period of excitement to that of "tolerance" without observing the state of collapse.

The employment of chloroform would leave nothing to desire, if one could succeed in freeing it from the states of excitement and collapse, and in establishing at the outset that of "tolerance." This certainly is observed sometimes, but in an exceptional manner; and the means which have appeared to us the most proper to produce this advantageous result, are the slowness and the well-managed graduation of the inhalation. We see, after what has been said, that the surgeon gives himself much more trouble when he wishes to obtain in his patient the state of tolerance; but if he succeeds in obtaining it, he is amply recompensed by the assistance which it contributes towards the success of the operation.

The action of chloroform, then, presents itself to us as being able to produce three different effects—excitement, collapse, and tolerance. Some present tolerance from the outset. Others arrive at tolerance immediately after the period of agitation. The greater number do not arrive at tolerance except after having passed through the other two states. Lastly, certain subjects seem "*refractaires*" to the anæsthetic tolerance.

CHAPTER II.

THE ANTI-HÆMORRHAGIC ACTION OF CHLOROFORM DURING OPERATIONS.

It is impossible for surgeons, who have performed a great number of operations with the assistance of chloroform, not to have been struck by the small quantity of blood lost during severe operations by certain subjects submitted to the action of this anæsthetic. It is for my part a remark that I have made a long time back. Without otherwise attaching importance to this particularity, I have not been able to prevent myself comparing the smallness of these losses of blood with the extent of those which have taken place during great operations performed without the assistance of chloroform. Reflecting on the mechanism, in virtue of which could be produced such a result, I understood very quickly that a subject in whom the physical and moral excitement caused by an operation accelerated the pulse to 120, ought by an open artery to lose more blood than the one who had only 60 pulsations a minute. I believed that I had found in this fact something very advantageous, and of direct application to practice, with respect to hæmorrhages that take place during operations. But to draw conclusions, and, above all, conclusions applicable to practice, something else besides impressions and reasonings, however plausible they might be, was necessary. I resolved, then, to submit to special observation a certain number of patients operated upon at the Hôpital St. Antoine. It is the results of these operations which I desire to submit to the attention of surgeons.

Eleven subjects, of whom three underwent amputations of the thigh, four of the breast, one of the leg, one an entire resection of the first metatarsal and of the first cuneiform bone, one a resection of the humerus, and one of the inferior maxillary bone, have furnished me the occasion to state that, whether in the period of collapse or in the period of anæsthetic tolerance, the losses of blood which constantly attend similar operations were enormously lessened, and that particularly in two cases (an amputation of the breast in a woman, and of the thigh in a man) the operation was performed, so to speak, without any loss of blood. In the latter case it is true that the compression of the femoral was made with great exactitude; but that which proved to us that the chloroform had a considerable share in these results was, that when I ordered my assistants to suspend compression, all the surface of the wound, with the exception of the principal artery, which furnished a very moderate jet, gave but a very inconsiderable quantity of blood, and that we were obliged to wait for the cessation of the anæsthetic state to render possible the ligature of the secondary arteries. As to the patient with the amputation of the breast, who was a little more than twenty years of age, and had come to be operated upon for an adenoid tumour of the right breast, there did not literally flow a teaspoonful of blood during the operation. I was wrong here in not waiting for the awakening of the patient before proceeding to the

dressing, and it is worth remembering that there happened a hæmorrhage which did not show itself until a certain time after the application of the dressing, and several hours after the patient had been taken back to her bed. It is not only with regard to arterial hæmorrhages that chloroform can be considered as diminishing loss of blood; it is with respect also to those of a venous character. We know, in fact, that the badly restrained struggles of a patient dispose him in a particular manner to venous hæmorrhage; for he is under the influence of two causes which play a considerable part in these sorts of hæmorrhages—first, an imperfect respiration; and secondly, energetic muscular contraction. Chloroform removes these two causes, but only by producing collapse or anæsthetic tolerance.

If we wish to render a rational account of the means by which happen the phenomena which occupy us, it will be sufficient to compare briefly the state of a patient operated upon under the ordinary conditions with that of one who has arrived at the period of tolerance. With the first, the fear of the operation about to be performed hurries the pulsations, increases the force of the impulse of the walls of the heart, and retards the free arrival of venous blood, not only in consequence of the impediment brought to respiration, but also by the efforts which the patient makes.

Thus, increase in the number of pulsations, augmentation in their intensity, stagnation of the venous blood, such are the circulatory conditions of the patient who submits to an operation without the employment of anæsthetics.

If these have been administered, what do we see? The pulse is less frequent and less strong, and there is a normal state of the respiration and venous circulation.

In comparing situations thus opposed, it is not difficult to understand the difference of the results with regard to the hæmorrhagic tendency.

Let us examine now what conclusions we can draw for practice from what has just been laid down. In this respect, and as the result of our observations, we might note—

1st. That the sedative action of chloroform during the period called tolerance diminishes in the patients—

- A. The number of pulsations.
- B. The force of the impulse of the beats of the heart.
- C. The stasis of the blood, the cause of venous hæmorrhages.

2nd. That the diminution of hæmorrhage during the period of tolerance can render real service in the cases of operations which suppose the possible opening of a great number of vessels.

3rd. That if it is sometimes useful, as has been recommended by some surgeons, not to make the dressing until a certain time after the operation, this advice becomes, so to say, obligatory after the employment of chloroform, the chances of an ulterior hæmorrhage being so much the greater as less blood has been lost during the operation.

(To be continued.)

THE DANGER OF ALL ATTEMPTS AT ARTIFICIAL RESPIRATION, EXCEPT IN THE PRONE POSITION.

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I HAVE shown, in a previous paper, not the inutility only, but the *danger* of the *warm bath* in the treatment of apnoea or asphyxia. I now proceed to demonstrate the danger of all attempts at the induction of artificial respiration—the special remedy against asphyxia,—except in the PRONE position.

If the asphyxiated patient be moved and placed in the supine position, in which no attempts at artificial respiration can be effectually made, what is the condition of the rima glottidis, or entrance into the windpipe? Is it *free*, so that air may be pressed or drawn into it? And if apparently free, does it remain so at the moment when an effort to force or draw air into it is made?

1. Is the tongue so securely situated, all muscular energy having ceased, as neither to *fall* backwards nor to be *drawn* backwards, and so close or obstruct the orifice and entrance into the windpipe?

2. Is there no accumulation of mucus, or other animal fluids, or of fluids from regurgitation from the stomach, which may also