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IMPORTANCE OF THE PULSE IN RELATION TO CHLOROFORM.

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There have been so frequently cases recorded in different Medical Journals of death from Chloroform, more especially in England, that perhaps any attempts to inquire into the cause may not be thought undeserving a place in this Journal. At the risk even of writing upon a subject *usque ad nauseam*, when opinions differ, and especially where life is at stake, every one who possesses experience is bound to give the professional public the benefit of that experience. I consider that I am in that condition—first, from the numerous and constantly recurring opportunities I have had since the first introduction of Chloroform into practice since 1847, not only in ordinary midwifery, but in all obstetric operations, (in all of which I consider its exhibition indispensable,) but, secondly and principally, from having been employed by most of my colleagues in the Infirmary, and several of my Professional brethren in Aberdeen for many years, both in their hospital and private practice, in administering Chloroform previous to the performance of surgical operations; it will, I presume, be considered that my experience at least has been ample, and that the views I entertain have not been arrived at upon light or insufficient grounds. I may further

mention, that every patient previous to a surgical operation, unless those connected with the mouth, and those of a trivial nature, is submitted to its influence, and that upon an average there have been about two and one-third operations weekly during the last seven years. But whether this may be considered satisfactory or not, or however much some men may differ, or even totally abnegate the views I advocate, I have yet this great satisfaction in knowing—and which is worth every other argument put together —that while the precautions I insist upon have been pursued, in no single instance has its inhalation been attended with alarming results, far less with fatal consequences.

I read constantly, that in giving Chloroform you must put only a certain quantity upon the handkerchief, or whatever else is employed; that it is only safe to give it with this and that peculiar apparatus; that you are to watch the breathing, says one, the flickering of the eye and state of the tongue, says another; while a third raises the arm and lets it drop, as the only indication that a sufficient and safe amount of anæsthesia is produced. Now, I neither do the one nor the other of these things. I care not how much Chloroform is poured upon the medium for its exhibition. I use no peculiar apparatus. I am indifferent as to the breathing, the eyes, the tongue, or any of these things. To one thing only do I attend, and that is the pulse—the state of the circulation; but from the moment my patient begins to inhale, from that moment, I keep my finger steadily upon the pulse, and by its rapidity, its regularity, and sometimes its volume, is the future quantity regulated. I know well that there are men of eminence in the Profession who ridicule and sneer at such a procedure, but I defy them to point out a case of death where the pulse has been made the guide. Indeed, so satisfied am I from very extensive experience, that this is the only sure and unerring criterion of the extent of its influence upon the system, that I fearlessly give it to every class of patient, and at every period of life, from the earliest infancy to extreme old age. Your readers must, however, understand, that it is not by merely now and then, at uncertain intervals, taking hold of the arm and feeling the pulse, that reliance on it is to be placed—the finger must never be off it when the inhalation is going on, and by this means, even blindfolded, the very earliest indication of danger is communicated.

There is a fatal case recorded as occurring in the Middlesex Hospital in July, 1854, where it is stated, "The pulse, which had risen to 120, descended to 70, having a full, steady, and deliberate beat;" again, "that at the end of ten minutes violent spasms were induced. These continued about three minutes, and then somewhat subsided." It then goes on to say that the pulse gave a few rapid and irregular beats, and then ceased, the face becoming pale and death-like; the inhaler was then removed instantaneously." On reading this case at the time of its publication, and on again perusing it, the same impression remains upon my mind—that to two circumstances may be attributed the unfortunate result:—1. As it is not specially stated to be otherwise, it is to be presumed that the inhalation was continued during the time of the "violent spasms," so as to get the patient as quickly over this state as possible—a plan which many recommend, and one, although I had misgivings, I once pursued myself. This I now consider extremely hazardous, because very seldom can the pulse be felt during the muscular rigidity, and because it is quite possible that the muscular walls of the heart may partake of the same state as the rest of the body. Be this as it may, if spasm or rigidity of the muscles prevents the pulse being distinctly felt, the inhalation must be instantly stopped until the spasms subside.

2. The pulse in this case is stated to have descended from "120 to 70." On reading this, one is led to conclude that a sudden dropping of the pulse to the lowest figure had taken place. Now this, in my experience, rarely happens; the time for the change is always appreciable and sufficiently well marked, if the pulse is steadily watched. There are, no doubt, differences in this respect in some cases, though rarely, as there are in the facility with which one patient inhales it over another; and this very circumstance is a strong argument in favour of a continuous watching of the pulse. I have known one more full inhalation at this stage, when the pulse has begun to fall, sink it suddenly so low, that had another been allowed the heart would have ceased to beat. Generally, however, the pulse does not sink suddenly, but gradually—hence it always gives warning; but no change, whether rapid or slow, must be disregarded. My plan is, therefore, never to persevere when rigidity comes on, and to stop, in like manner, when the pulse begins to fall, or else to give it very cautiously, and this cannot be done unless the finger

is constantly on the pulse. So much for the velocity of the pulse —the chief point of attention. There are, however, two other qualities of the pulse which deserve attention—one is a state absolutely debarring its continuance; the other state is comparatively of little value.

The first of these states, that of danger, is where the pulse becomes irregular or intermitting. This is not a common occurrence, nor does it seem to be dependent upon manifest disease of the heart, as far as I have observed; yet I have always desisted, whenever this state of the pulse has come on, fearing some untoward result. One case I well recollect was upon the operating table, and was being put under Chloroform: on three several times, just as unconsciousness was manifesting itself, the pulse became at once intermitting, and fell down perceptibly in quickness, without the slightest change in the breathing or rigidity of the muscles. In a few seconds the irregularity had ceased, and the inhalation, which had been stopped, was resumed. Again the pulse intermitted. A third time the same effect was produced, on resuming the inhalation. In another case, that of a very stout female, a monthly nurse, who was about to have a fatty tumour removed from the shoulder. This irregularity in the pulse, twice in succession, showed itself on approaching unconsciousness, and latterly with excessive congestion of the face, but without spasm. I declined to continue it, and the patients were operated upon without it. This peculiarity in my experience is very rare; for I cannot recollect, out of many hundred cases, above five or six where it came on. Three of the subjects were very fat persons. May not the same state of the heart have led to this peculiarity?

The other state of the pulse is its volume. This I consider of little or no value as a guide, although, in every case, this is one of the first, if not the very first indication of commencing anæsthesia, the pulse becoming full and almost bounding. If the patient is in previous health it is also quickened; as the effects become more manifest, the fulness subsides to its ordinary state, and remains, with very little alteration as to strength, throughout the period of unconsciousness. Continue the inhalation, and its velocity or rapidity is altered; but, unless the pulse falls very much in quickness, its volume is seldom much affected. No reliance, is, therefore, to be placed on this state; it gives no warning of the nearness

of danger, for I have seen it full, at least not weak, when its velocity was but 60. The only occasion where volume, or in other words, its strength or weakness is of moment, is—when a patient loses, or is likely to lose, much blood during a surgical operation; then double caution is necessary in administering Chloroform. Hæmorrhage weakens the strength, but increases the velocity of the pulse. Chloroform alone lessens the velocity; but, unless in excess, seldom alters the strength or volume of the pulse. Faintness, or complete syncope, may be only the effect of the hæmorrhage; but, when faintness is present, even with imperfect unconsciousness from Chloroform, it is always alarming, as the means at our command for rousing and stimulating the patient are limited to external means. Hence, I repeat, great watchfulness is requisite in continuing Chloroform when hæmorrhage is going on; and here the pulse is the sole and unerring guide.

With regard to the mode of administration, I have nothing new to announce. There are, however, a few points which I always attend to, and which I may be excused mentioning, as I believe them to be of importance.

1. I use a clean white, thin, or cambric pocket-handkerchief, folded from the corners inwards, as recommended by Professor Simpson, as being most easily managed.

2. I never measure the quantity poured upon the handkerchief, but thoroughly wet the centre, (which is made slightly hollow,) perhaps to a space the size of the palm of the hand. This must be renewed every few seconds, as it rapidly evaporates.

3. I never force the breathing of it pure at first, and always avoid coughing; hence the handkerchief is so held that a portion of atmospheric air is mixed with the chloroform; gradually it is brought nearer, so that at last the mouth and nose are covered, and it is then inhaled pure.

4. In all cases I produce complete unconsciousness at first, whether this state is to be kept up to the same extent or not; by this means a single inhalation afterwards, on any movement appearing, readily affects the patient. With half measures at first this is not so easily accomplished.

5. The person giving Chloroform should have nothing else to attend to; his attention ought to be entirely confined to its administration and effects. I recollect some years ago assisting an

eminent professor of surgery at an operation, where inattention to this rule proved nearly fatal to our patient. But if, as sometimes happens, when perfect and deep anæsthesia is induced, a few minutes pass without its being necessary to inhale, then this rule may be relaxed. I have in such circumstances frequently had to apply the midwifery forceps, and attend to the Chloroform at the same time. The safe rule is, however, exclusive attention to the inhalation.

6. I find that much of the dread which patients experience on first taking Chloroform preparatory to a surgical operation, is removed by making them inhale it the day previous. Any fear or reluctance they may have had is thus invariably removed, and when upon the operating table they take it much more readily, and hence are much sooner affected.

7. If possible, the stomach should be empty, or the food should have been taken some hours before inhaling it; by this means sickness and vomiting are avoided. The nausea previous to vomiting often depresses the strength of the pulse, and may cause alarm; but as there is seldom perfect unconsciousness, the pulse remains quick, and on the occurrence of vomiting the weakness of the pulse disappears.

In conclusion, I always take care to have a small phial with strong liquor ammonia at hand; the only restorative I have ever had occasion to use.

Aberdeen, 6th May, 1857.