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REPORT OF A CASE OF POISONING BY HYDROCYANIC ACID; WITH REMARKS.

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(Concluded from page 466.)

At the risk of being tedious, I have related the details of this case with more minuteness than I should think proper to do in death resulting from almost any other poison, and shall venture to add some observations upon them, because it appears in the present state of our knowledge of the effects of large doses of hydrocyanic acid upon man, to be important to state as fully as possible all the circumstances of an instance like the present, which, perhaps, notwithstanding some recently reported cases, is one of the most remarkable yet met with, and was observed under more favourable circumstances for correctly ascertaining the facts; the chemical analysis is fuller and more complete than in any case on record; and it tends to correct some errors which are generally entertained by even the highest authorities, but which it is of much importance should be removed.

The first question is the length of time between taking the acid and death, as well as the period during which consciousness, volition, and power of motion continued.

It certainly was not eleven o'clock when I saw the deceased, and my belief is decidedly, that it wanted ten minutes to eleven. The heart did not cease to beat until at least twenty-five minutes after eleven, and supposing that the poison was taken ten minutes before I arrived, and this time must have been taken up—indeed, Mr. Tennant, in his evidence says, “not more than a quarter of an hour,” but on conversing with him he tells me he stated the outside, and that it perhaps was not quite so much; this leaves about the time stated, three quarters of an hour, during which life continued. Was the poison taken below stairs or not, until he got into the room up-stairs? It appears he entered the house without being seen by any one, and passed into a room on the right hand side of the outer door. In this room there was a glass in which gin and water had been, a jug containing warm water, and a spittoon. In this room, judging from the creaking of the front door, he remained for a short time—not more than two minutes, left his hat, and took with him a tumbler glass, and ran along a passage to the left, and up a considerable flight of stairs, opened a door, closed it to again, passed quickly across a large room to throw himself upon a sofa at

the end of it, where in about another minute, (three from his entering the house,) he was found lying on his back, but on a gentleman entering the room, he immediately got up into, and remained in, a sitting posture, without speaking. His appearance gave the witness the idea that he was drunk. After a short time he was again found sitting upon the sofa, but so far reclining as to show loss of muscular power; there was also less consciousness, for when addressed at some little distance his answer was not intelligible, but when near, his reply was not only understood, but showing consciousness of what he had taken and of the effect of it. I need not refer to his condition when I arrived. The glass he had taken up stairs was upon the end of the table near to the door, and many feet from the sofa where he lay. It was perfectly empty and without any smell of hydrocyanic acid or of gin. The bottle found in his pocket was an ounce stopper-bottle, such as is ordinarily used for the acid; it was labelled “hydrocyanic acid, Scheele's strength,” and had been enveloped in blue paper, which was partially scraped off. If we suppose he took the acid down-stairs, he must have poured it into the tumbler, then rinsed the glass out, and thrown the water into and about the spittoon, and put the stopper in the bottle, and this into his pocket either before or after taking the acid. I am strongly inclined to think this was done. Water was left in the jug by the person who had last used it; it was found emptied and the spittoon and all about it was very wet, as though the water had been hurriedly dashed in and about it; no one but the deceased had been into the room; this I enquired particularly into when I reached the house. I then ordered the room to be locked until I could myself examine it. The leaving the hat in the room, the running up stairs, clashing the door to, and the appearance of intoxication, (the deceased was a stout and very sedate man,) all favour this idea. If, on the contrary, we suppose the poison to be taken up-stairs, there is nothing to account for the hat being left below, the water splashed in the spittoon, the running up stairs, and the glass being taken up stairs, for he must in this case have drunk the acid undiluted from the bottle, by putting it to his mouth immediately he got into the room, for, as before stated, the glass had no smell of the acid, and there was no means of cleansing it, there being neither water nor cloths in the room. Besides which, he must without purpose have rinsed out the glass below, for as there was no smell of gin, it is clear there had been water in it last, for a glass used for gin and water retains the smell for a long time. But even if it be supposed the acid was taken up-stairs, it is evident con-

sciousness and volition continued for some minutes,—far longer than in any case on record.

What was the strength and quantity of acid taken? Nothing very positive can be said. It was proved that on the Saturday morning, two days before, he purchased an unopened bottle of Scheele's acid, the stopper being, as is usual, tied over with leather. The bottle was found in his pocket, containing only about two and a half drachms. These circumstances led me, at the inquest, to suppose a larger quantity of the poison had been swallowed than probably had been, for it turns out, on analysis, that the acid, instead of containing five per cent. of acid, contained only one and a half; and that there could only be procured from the contents of the stomach under half a grain of pure anhydrous acid, being equivalent to twenty-seven grains of the acid in the bottle, or about ten of Scheele's strength. This, however, must not by any means be considered as indicating the extent of the acid taken, for during the period life continued, doubtless some would be given off by respiration, some would be lost, I imagine, however carefully the loss might be guarded against in the analysis, by the remedies used; during the *post-mortem* examination of the body, the loss from volatilization would be something; a portion would be diffused through the blood and tissues, and some would adhere to the mouth, œsophagus, and coats of the stomach, which could not be accounted for, only the contents of the stomach being subjected to quantitative examination. The leather with which the bottle was tied over could not be found, it is therefore probable that the bottle had been opened before the Monday morning. I have ascertained that none of his family had seen the bottle or leather cap, nor had they heard him allude to hydrocyanic acid, nor perceived any smell of it in or about the house. Taking all the circumstances into consideration, his purchase of an ounce of the acid, and the evident premeditated intention of self-destruction, I am induced to think a much larger quantity was swallowed than the analysis would at first sight lead one to suppose.

Of the strength of the acid swallowed, it is impossible to speak. If taken up stairs, it must have been of the strength found in the bottle, one and a half per cent.; if below, it may or may not have been diluted. What ground there is for supposing the effect of hydrocyanic acid to be less potent when diluted, as some have asserted, I am unable to say.

The symptoms are interesting, as adding another to the recorded cases in which there were no violent convulsions, nor any shriek, which has been dwelt upon as being characteristic of the poison. This reliance upon the shriek has always surprised me, for even in animals there is nothing more uncertain, even in the same species. Out of the great number of dogs, cats, and rabbits which I have destroyed by the acid, I believe the majority did not shriek. In some the effect is almost instantaneous—a few violent struggles, followed by a rest; then a struggle and cry; an involuntary passing of the urine or fæces, and death,—the heart pulsating for some time after. All other appearances of life have gone, the creature scarcely having moved from the spot. At other times I have seen a dog run about staggering for a minute or more, making attempts to howl, but without succeeding. On the whole I cannot but think that the instantaneous effects

of hydrocyanic acid have been exaggerated, and that the quantity necessary to procure death has been somewhat under estimated. But different animals will be very differently affected. Thus birds die almost instantaneously. It is sufficient to put the beak of a small bird (a sparrow) into the mouth of a bottle containing only a very small portion of the acid, and the vapour will, in a few seconds quietly, though paralysed without convulsions, destroy it. Mice are very susceptible of its action; rabbits are much more so than either dogs or cats. On the other hand, cold-blooded animals are almost proof against its influence. I have given it to frogs without producing much effect. It is, therefore, most unsafe to draw positive conclusions from its effects upon animals as to what will occur in man. The quantity which some persons bear is much greater than others can. Some time ago I saw such decided effects produced upon a boy by merely dropping three drops of Scheele's acid within the palpebræ, that I deemed it prudent not to repeat it, and had to administer stimulants at the time, with which the effects very speedily vanished.

The appearance of the eyes is, next to the smell of the acid, as a symptom, the most characteristic; the prominent glassy state of the ball, and the dilated pupil, were as decided in this case as I have uniformly witnessed in animals;* but the variation in the degree of dilatation was most curious, and did not terminate with death. At first the pupils were very widely dilated; before life altogether ceased they became rather contracted than otherwise; a few hours after death, when the examination of the body was made, they were more dilated; and on the following day, twenty-seven hours after death, they were still more dilated, but not to the extent they were when I was first called to him. At this period, twenty-seven hours after death, the eyes were altogether different from what I ever saw in any other corpse; though not so prominent as during the action of the poison, they were more so than usually found even during life; they were clear and bright; the cornea was perfectly distended and glistening, and, as I have said, the pupils dilated. There was nothing cadaveric in their appearance; except the fixedness, they were more brilliant and animated than during life; indeed, this was so marked, that a son and a relative of the deceased, who were with me, were much impressed with it. The rigidity of the body at this time was as after death under ordinary circumstances.

It has been stated that decomposition of the body speedily comes on; this is possible, though I doubt whether it does so. In this case it did not. There was not the least perceptible change at the time I speak of. The body was not interred until Friday, the fifth day after death. Nothing unusual was observed, but as it was summer, and the friends were anxious, some packets of dry chloride of lime had on the second day been placed in the coffin with the corpse. This may have retarded putrefaction.

No time was lost in applying such remedies as could be quickly procured. Cold water was dashed frequently and freely upon the face, neck, and chest; the latter

* To induce dilatation of the pupils must be regarded as one of the most decided properties of hydrocyanic acid. When applied locally by dropping it upon the conjunctiva, great dilatation of the iris is almost immediately caused.

was rubbed with strong liquor ammoniæ until the cuticle was abraded, or even deeper effect produced; the feet were placed in a pail of hot water, with mustard. Ammonia was given as a stimulant, and chlorine as an antidote. These were procured from the nearest druggist. The solution of ammonia was much stronger than I calculated upon; I did not dilute it sufficiently, and the lips were vesicated; the pain of this was evidently acute and quickly felt. From the fixedness of the jaw, it was with difficulty that any fluids could be forced into the stomach, but some quantity of both fluids I feel confident did reach it.

Two other remedies have been mentioned, as proper in cases of poisoning by prussic acid—electricity and bleeding. The first, did circumstances allow, I should certainly be disposed to try, but it is obvious the cases must very rarely occur where opportunity will be afforded for its application, except where everything is arranged, as in an experiment, before hand. The time required for procuring and setting in action either galvanic or electrical apparatus must, unless in most fortuitous circumstances, preclude it from being relied upon in practice. Bleeding is a means, which in the absence of direct experiment, I should not set any great value upon. So far as we possess information of the *modus operandi* of the poison and the symptoms produced by it, venesection is not indicated. The only conceivable means in which the abstraction of blood could be useful, would I apprehend, be by relieving the engorgement of the heart, and thus possibly facilitating its propulsive powers. But it must be borne in mind, that the action of the poison is upon the nervous system.* Its effects are in some instances too instantaneous to act upon any other tissue, and there is little difference in the effect, whether swallowed, or applied upon any membrane or abraded surface; and the *post-mortem* appearances are rather of a negative than positive character, so far as any structural lesion is concerned. That the heart is not primarily affected is certain, from its being almost if not the very last organ which ceases to show signs of vitality. The length of time which it continues to pulsate, after every other sign of life is fled, is greater in death resulting from prussic acid than from any other cause with which I am acquainted. Its pulsations are weak, feeble, and slow, indicating, I think, that the stagnation of the blood is the result of want of propulsive power in the heart itself, and not that the loss of power of emptying its cavities depends upon mechanical obstruction to the flow of blood and consequent paralysis from over distention. In asphyxia the cause of the engorgement of the heart is altogether different: here there is a mechanical impediment to the flow of blood through the capillaries of the lungs, which the heart is unable to overcome, hence the distention of its walls and their inability to propel their contents. The engorgement is mechanical and secondary; the most direct means of overcoming which, is obviously to lessen the force to be overcome by abstracting so much blood, (of course at the same

time altering the condition of that which remains, by exposing it to the air,) as shall enable the heart to contract upon and expel that which remains. But if the view which I have taken be correct, the condition of the heart under the influence of the hydrocyanic acid is altogether different; here the distention is primary, from want of propulsive power. This, it is highly probable, is subsequently aggravated by change in the blood, and as well as by the want of change in the lungs, the respiratory function being also impeded: venesection might possibly relieve this latter to some extent, but I do not perceive how it can necessarily affect the former. Hence I should not be disposed in the first instance to bleed, but I should do so after the system had become roused, in order to remove the load of blood, and prevent after congestion.

Of all the remedies I am acquainted with, I should be disposed to place most reliance upon cold affusion. In this instance, more effect was produced by the dashing of cold water than by any other means. Some years ago I well recollect taking a very large Newfoundland dog to the side of a pond, and giving him upwards of a dram of hydrocyanic acid, originally of Scheele's strength, but having been kept some time, it had probably lost something of its strength, yet, I am convinced was sufficiently potent to destroy life. He almost immediately began to stagger, when two of us seized him by the legs and threw him into the water, in which he swam about for a time, and presently came out, not much the worse for the dose. Should I have to treat another case of poisoning by hydrocyanic acid, my first step would be to strip the body entirely, and practise cold affusion over the whole body, with the exception of the feet, which I would place in hot water; administer ammonia and chlorine—then, when it could be swallowed, a sulphate of zinc emetic.

Chemical Analysis.—As hitherto attention has been principally directed to the finding of hydrocyanic in the stomach, and it appeared uncertain whether or not its presence could be detected in the fluids, or other parts of the body, I was wishful to determine the point. Accordingly, the contents of a portion of the small intestine, arterial and venous blood, and the serum from the ventricles of the brain, as well as the contents of the stomach, were removed for analysis. The extreme accuracy and skill of Mr. West will be a sufficient guarantee as to the correctness of the chemical report. From this it would appear, that not only may the acid be traced in the stomach, but also in the small intestines, in the blood, and in the serum of the brain. The traces were feeble, it is true, but such as the chemist would rely upon, as sufficient to indicate its presence. It is curious that no trace of acid could be detected in the venous blood, which we should *a priori* suppose to be that most likely to contain it. Perhaps in this instance, it may have depended upon some accidental cause. It is worthy of remark, that the statements made with regard to the action of nitric acid upon cyanide of silver, and which in toxicological works is much dwelt upon, as characteristic of this substance, is not correct. He found that the precipitate of cyanide of silver was dissolved in cold as well as hot nitric acid. Since then I have tried the effect of nitric acid upon cyanide of silver, made with hydrocyanic acid of different strengths,

* In a case recently reported, where the person lived a long time, and walked some distance after taking prussic acid; this is attempted to be explained on the supposition that it had been retained in the mouth and not swallowed. Even were the fact of its being so retained proved, it would be worth little, for it seems probable the acid acts as quickly when applied to a mucous surface as when swallowed.

as well as nitrate of silver solutions of different strengths, and I am satisfied that it is as stated—only a question of proportion. If the precipitate is not very copious, and occasioned by only weak solutions of the acid and salt, then cold nitric acid dissolves it, even if the acid be not of the strongest; but on the contrary, if the precipitated cyanide be abundant, in large flakes, and made from stronger solutions of the nitrate of silver and hydrocyanic acid, then concentrated boiling nitric acid is required for its solution.

The persistence of hydrocyanic acid is of much importance, and is altogether opposed to the opinions of our best toxicologists, who state that after a few days all traces of the poison disappear, it undergoing decomposition; and yet we find, that twenty-three days after death, the acid is found without any perceptible alteration in its strength, although placed, as we should suppose, in the most unfavourable circumstances for its preservation, being mixed with a mass of partially digested food, the weather being sultry, and no pains taken to ensure its preservation. It is obvious the statements made in books, that the fact of not finding hydrocyanic acid eight or ten days after death has taken place affords no proof that death has not been occasioned by this agent, must be materially modified. The not finding it even after a much longer period will not, I apprehend, be considered as presumptive evidence of death *not* having been occasioned by it.

The only other point to which I shall direct attention, is the ignorance of druggists, and the different strength of drugs. Here we have a druggist coming forward and stating that not only does he not know the strength of the ordinary preparations of hydrocyanic acid, but that, in the compounding of prescriptions, he is constantly in the habit of using a preparation containing two and a half times the quantity of a deadly drug of that which the prescriber intended to be employed. But another point of even more importance, for this ignorance and most culpable carelessness might belong only to the individual, is the fact of an unopened bottle of hydrocyanic acid being labelled Scheele's acid, which ought to contain five per cent. of real acid, and yet on analysis is found to contain only one and a half per cent. Such uncertainty spreads far and wide. For this the manufacturing chemist deserves the severest censure; against such errors the medical man has no means of protecting himself or patient. Suppose a person has been taking prussic acid for some time; the effect has not answered expectation, and the dose has been gradually increased, until perceptible effects are evinced, and they had given acid, supposed to be Scheele's, but in reality only containing a fourth part of it. He then has the medicine made up elsewhere, or the druggist gets a fresh supply of the acid, which is of the correct strength; it is obvious that nearly four times the contemplated quantity would be swallowed, and if the previous dose had been carried to the extent prudence dictated, death would probably be the result,—nature, the drug, or the doctor bearing the blame, while the manslaughter, for such, to speak mildly it deserves to be considered, would rest upon the ignorance or carelessness of the chemist or druggist.

CURIOUS CASE OF MALFORMATION OF THE HEART, SIMULATING THE PHYSICAL SIGNS OF ORGANIC DISEASE OF ALL THE VALVES.

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On the 6th of November, 1843, I visited Harriet Tinker, a delicate child of eight years of age. She had been occasionally subject to a slight cough; now and then to slight bloody expectoration; and occasionally, before that kind of expectoration appeared, looked blue about the mouth and eyes. When I first saw her, she had coughed up a full pint of florid blood, and was very faint.

As soon as she recovered sufficiently, I examined her chest, which was well formed, except that the left side was rather more prominent than the right; the infra-clavicular regions rose equally on inspiration; but her respiration was rapid. The inferior part of the right lung was duller on percussion than the left; and there was some *crepitant*, or rather *crackling* rhonchus there, but no *loud expiratory* murmur, or bronchophony. The apex of the heart beat between the sixth and seventh ribs, one inch to the sternal side of the nipple, and half an inch below it. There was a *flat* sound over a much greater extent than natural in the cardiac region; on a level with the superior margin of the third rib, on the sternum, a loud bellows-sound with the first or systolic beat of the heart, which was heard louder under the *right* clavicle, and not under the left; another loud rasping bellows-sound at the *ensiform cartilage*, with the first beat, which decreased in intensity as you left that spot; and another systolic bellows-sound at the *apex*, more feeble than the others, which decreased in intensity higher up the ventricle. There was a slightly perceptible *purring tremor* over the apex, and very great jugular pulsation in the neck. The pulse was very different in intensity in the two wrists, the right being the strongest.

My diagnosis was, *dilatation of the right auricle, and regurgitant disease of the tricuspid valve*, which accounted for the jugular pulsation and systolic murmur at the ensiform cartilage; *regurgitant disease of the mitral valve*, which accounted for the hæmoptysis and feeble systolic murmur at the apex; *contractile disease of the aortic valves*, which accounted for the systolic murmur at the top of the sternum, and under the right clavicle; and cyanosis, from patent foramen ovale.

Feeling an interest in the progress of this case, I watched her carefully. Every three or four weeks she was seized with hæmoptysis to a greater or less extent, accompanied by symptoms of cyanosis; but, during the intervals, she had very little, if any, cough; and sometimes appeared to be in tolerable health, with this exception—that she was not capable of taking any exercise without producing very rapid respiration and violet colour of the skin, on which occasions the jugular pulsation was very great. The respiratory murmur became quite natural all over the chest in the course of a week or ten days after each attack of hæmoptysis, until the last few months; but the valvular sounds became gradually decidedly more of a rasping character.