is usually found healthy, and that polyuria is associated with many forms of cerebral abnormality situated in different localities.

The Peripheral Nerve-Lesions.—When this patient came under observation, the lower parts of the face were found expressionless, and with impaired motion; the lower lip hung down, saliva trickled from the mouth, the lips were inactive, the food collected in the mouth, the tongue was sluggish in its movements, and was much atrophied, and the speech was hesitating and mumbling. In short, the case presented all the features of typical glosso-labial paralysis. The patient had visited various hospitals, and her disease had invariably been diagnosed as bulbar paralysis, to which there can be no question it presented the strongest resemblance. On applying electrical tests, however, reactions were obtained which were not anticipated. In bulbar paralysis, the nerve-trunks and their terminations remain healthy throughout the entire progress of the disease, or, at least, till its very latest stages, and the muscular fibres remain normal for a considerable period, after which they slowly undergo degenerative change. Hence the faradic current, when applied to the nerve-trunks or to the muscles, induces normal reactions; and galvanism, acting on the former, is followed by the same, but, on the latter, indicates both quantitative and qualitative alterations. In the case before us, which was a comparatively recent one, totally different reactions were discovered. The trunks of both facial nerves, if not absolutely insensitive to both currents, were greatly diminished in excitability. Faradism to the facial muscles caused little or no contraction, whereas galvanism induced vigorous action with the polar reactions reversed. Faradism, again, to the muscles of the tongue was followed by no response, while galvanism was succeeded by increased action, and inverted polar reactions. Such phenomena are evidences of neuro-muscular paralysis, and not those we are accustomed to meet with as a result of central disease, in which, as above stated, the nerve-trunks and their extremities remain healthy throughout. During the life of the patient, there might have been some hesitation in making a positive diagnosis, as, in spite of the physical demonstration just described, it seemed most improbable that both hypoglossal and both facial nerves should be degenerated, leaving the other cranial nerves and functions of the brain intact. Such, however, the *post mortem* examination showed to be the case, as extensive disease of the base of the skull, not sufficiently pronounced to cause gross pressure elsewhere, involved the foramina through which the above nerves passed, evidently pressing on their structure, as evidenced by their peripheral degeneration, and their healthy proximal extremities.

The patient, on interrogation, said that she experienced slight numbness of the face and difficulty in mastication, but no definite objective signs of this could be determined. It is, however, not improbable that, although the trunks of both fifth nerves appeared healthy, they also may have been slightly involved in the disease. The portio dura, on one side, was evidently implicated, accounting for the deafness during life, which may also be explained by the conditions found after death.

This case is a striking example of the great importance of electro-diagnosis in the investigation of obscure paralyses. Without its aid, this patient would certainly have been considered to be suffering from bulbar paralysis; whereas, by its assistance, we were enabled to diagnose, in the face of great improbabilities, the existence of peripheral, and not of central, disease.

A GLARING illustration of the great amount of ignorance prevailing among mothers, in respect to the proper feeding of infants, is shown in a case which recently came before Mr. George Collier, the evidence of which showed that a child, aged eleven months, being fretful from birth, the mother had given it anything to eat which it fancied. The result was that it had breaking out on its body and convulsions; and, ultimately, it had a fit, and it also seemed to have had two falls before Christmas. Having another fit, a doctor was sent for; but, before a bath could be got ready, it died of convulsions, certainly set up by improper feeding. The coroner, wisely dilating upon the crass ignorance of mothers, as shown repeatedly before him, and the gross stupidity of giving a child of tender years meat and other food which its digestive organs found it wholly unable to assimilate, said that mothers in this matter, and many others, would never grow wiser until the duties of maternity became part of the curriculum of the public schools. The jury said they hoped the case would carry its moral to other mothers, and returned a verdict in accordance with the medical evidence.

REMARKS ON THE DEATH-RATE OF ANÆSTHESIA, WITH AN ACCOUNT OF SIX FATAL CASES.

By W. ROGER WILLIAMS, F.R.C.S.,
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DURING the last few years, an impression has arisen in the profession, and has been communicated to the general public, that the induction of anæsthesia is a much more dangerous proceeding than was formerly believed. The numerous fatal cases lately recorded in the journals have proved, in the clearest manner possible, that this impression is only too well founded on fact.

My own experience, which there is no reason to regard as singular, leads me to believe that the real dangers of this proceeding are still very greatly underestimated. The majority of fatal cases are hushed up; only a few find their way to the journals. Six deaths from this cause, none of which have been made public, have come under my immediate notice during ten years of hospital work.

On an average, I have, probably, witnessed the induction of anæsthesia about four times a week, during the whole of this period—an estimate over, rather than under, the mark. Hence, the mortality in these cases may be roughly stated at 1 in 350 inhalations. But it should be remembered that this does not represent the whole of the danger, for, in a still larger proportion of cases, alarming symptoms supervened, and fatal results were only narrowly avoided. As far as I can judge, the number of times that chloroform and ether were severally administered was about equal. Five deaths resulted from the use of the former agent, and one from that of the latter. In the former category, I have included three fatal cases, due to the use of a mixture of two parts of chloroform with three parts of ether; because, as an anæsthetic agent, the action of this mixture precisely resembles that of chloroform.

Calculated on this basis, then, the death-rate for chloroform would be 1 in 208 inhalations; and that for ether, 1 in 1,050—the lowest estimate possible. Although the total number of cases on which this statement is based is not so large as, under the circumstances, might be desired, especially as regards ether, I think, nevertheless, it may be accepted as conveying a more correct idea of the dangers actually involved, than any of the statistics usually quoted.

In the JOURNAL of December 30th, 1882, the death-rate for chloroform is given as 1 in 2,873 inhalations, and that for ether as 1 in 23,204—a ridiculously low estimate. Perhaps some of your readers will be able to explain these remarkable discrepancies, and to decide which statement most nearly approximates the truth. I ought to add that my field of observation has been a wide one, not confined to one institution or one method, but comprising several metropolitan and provincial hospitals; hence I think it may fairly claim to be typical of the kind of practice it represents.

I now propose to give a short account of each of these cases, and then to conclude with a few additional remarks.

CASE I.—This patient was a stout, well-built, florid man, aged 37, rather above the usual height. He was in a robust state of health at the time of the fatality; and he had previously been of moderately temperate habits. He was sent from the out-patient department to the operation-theatre, to have a small piece of dead bone removed from the end of the stump of his right forearm. The limb had been amputated a little below the elbow-joint, about a year previously, for a bad crush involving the hand, wrist, etc.; and anæsthesia had then been induced without any trouble, by the gas-and-ether method, with Clover's apparatus.

For an operation of such a trifling nature, gas alone was deemed sufficient, and he was nearly under its influence, when it was found that the supply in the reservoir was exhausted. Chloroform was now sent for; and, during the delay thus involved, the patient completely recovered consciousness, and said he thought he had been for a ride in the train. About a drachm of chloroform having been poured without measurement on to a piece of folded lint, the administration was effected by holding this rather closely over the patient's mouth and nose. To prevent the dissipation of the rising vapour, a large towel was thrown over the patient's face, as well as over the administrator's hand. By this means, after a well-marked stage of muscular excitement, sufficient anæsthesia was induced in less than three minutes. Immediately after the first incision, it was noticed that the patient had stopped breathing; that the face was livid; and that the pulse had ceased to beat. The face then rapidly became pallid; but subsequently resumed much of its duski-ness. These symptoms supervened suddenly, without stertor or any other

warning. Artificial respiration, laryngotomy, etc., failed to revive him.

At the necropsy, twenty hours after death, there was but slight rigor mortis. The head, face, and dorsal part of the trunk were of a purplish colour. The parietes of the chest and abdomen were heavily laden with a thick layer of fat; the omentum was in a similar condition. The heart was rather large; its consistence flabby, and its valvular apparatus healthy. Externally, it was laden with fat; and, on section, the muscular substance appeared to have undergone slight fatty changes. Its right side and the large venous trunks were gorged with dark semicoagulated blood. Its left side was somewhat contracted, and nearly empty. The lungs were congested, but otherwise healthy. The kidneys were rather large; their capsules separated readily; they were congested, and presented slight fatty changes. There was subarachnoid effusion over the vertex of the brain; and the lateral ventricles were full of clear straw-coloured fluid. The other organs and the soft parts of the body generally were congested.

CASE II.—A woman, aged 43, the subject of orthopnoea, due to aneurysm of the aortic arch of some standing. A firm pulsating tumour, of the size of the large end of an egg, presented in the middle line above the top of the sternum. She had great difficulty in breathing; and marked oedema of the left side of the face. She was decidedly syphilitic. After undergoing treatment by rest in bed, low diet, and iodide of potassium for a month, without any improvement taking place, it was decided to ligature the left common carotid artery. When she appeared in the operation-theatre for this purpose, she was in a very weak state; an attempt to place her in the recumbent position brought on a severe attack of dyspnoea. She declared she never could endure this position, and that it would kill her. Being propped up by some pillows, however, she was persuaded to recline somewhat; and chloroform was then administered on lint, as in the preceding case. She inhaled it quietly for a few minutes; then she turned pale; ceased breathing; became cyanotic, and died. This happened before the operation had been commenced. Such remedies as artificial respiration, inflation, and laryngotomy were resorted to; but in vain.

At the necropsy, twenty-four hours after death, a remarkable complication of disease was revealed. The face, neck, and fingers were of a purplish colour, and rigor mortis was present. The superficial veins of the neck were enormously swollen, and full of dark blood. The deep veins of this part were similarly affected; but the left internal jugular was shrunken and almost empty. A sacculated aneurysm, of pyriform shape, measuring three inches in its long diameter, was found springing by its base from the transverse part of the aortic arch, with which it communicated by a round orifice of the size of a florin. It passed upwards, between the innominate (which was dilated) and the left common carotid arteries, to the fossa at the top of the sternum, where its apex had been detected during life. The wall of this aneurysm was very thin in front, where it adhered to the back of the first piece of the sternum, having compressed and completely obliterated the left innominate vein at this spot. Elsewhere it was thick, and adherent to the abundant deposit of laminated fibrin, which occupied nearly two-thirds of its interior. Behind, it touched the trachea, which was slightly flattened at the point of contact, but not to such an extent as to interfere with its patency. The adjacent nerves and other important structures had sustained no damage from the aneurysm. The right side of the heart was distended with dark semicoagulated blood; the left side was flaccid and empty. The auriculo-ventricular valves were beaded with old calcareous and atheromatous nodules; the aortic valves, in addition to being similarly affected, were hypertrophied and dilated. The organ was large and hypertrophied, especially the left ventricle. Its muscular substance appeared to be healthy. On both sides, the lungs were firmly bound to the chest-walls, throughout their whole extent, by old adhesions. They were large, emphysematous, and intensely congested. On section, abundant muco-purulent matter exuded from the divided bronchi. The brain was much congested; and there was excess of serous fluid in the lateral ventricles. The other organs presented no noteworthy changes.

CASE III.—I will now relate the case of a woman, aged 55, who was admitted with a strangulated femoral hernia and stercoraceous vomiting. The symptoms of strangulation were of fifty hours' duration. She was brought into the operation-theatre in an extremely weak and exhausted state. Anæsthesia was induced by nitrous oxide gas and then it was kept up by ether, Clover's apparatus being employed. She was very quiet from the commencement of the process; and there was no muscular excitement. Sufficient anæsthesia was thus induced in four minutes. Gentle taxis was then

applied to the rupture. After the first few manipulations, the patient suddenly became pale: she vomited grumous stercoraceous matter; the pulse ceased; the breathing became weak, and she soon died. In this case, after other remedies had been tried, a weak solution of sal volatile was injected into the right median basilic vein; but without producing any obvious effect.

The necropsy took place twenty-eight hours after death; when rigor mortis was well marked. The trachea and larger bronchi contained some of the stercoraceous vomit; but none of it could be traced into the smaller divisions of the air passages. The lungs were slightly congested, but otherwise remarkably healthy. The heart was flabby and dilated, its walls thin, but not otherwise diseased. The right side contained dark fluid blood, and the large veins were rather full; the left side was flaccid and almost empty. The valvular apparatus was normal. The aortic arch presented numerous patches of atheroma. The peritoneum was injected, especially in the vicinity of the damaged gut, where there was an effusion of recent lymph. The stomach contained much grumous fluid, and a large quantity of partially digested food, among which large pieces of cabbage and potato could easily be distinguished. The kidneys, liver, and spleen were normal. The uterus presented several small fibroid growths. The strangulated gut comprised about four inches of the lower part of the ileum. It was of a dark purple colour, but not much thickened, and still retained its glistening appearance. There was no rupture of its walls. The brain was not examined.

CASE IV.—This patient was a woman, 52 years old. She had a round-celled sarcoma of the left upper jaw, the size of a small apple, which was of nine months' growth. She was pale, thin, sallow and weak. It was proposed to excise the left upper jaw bone, and the growth with it. The anæsthetic agent used was the mixture of chloroform and ether. It was given in a leather inhaler, perforated at the top with small holes, and containing a sponge inside. The patient's head and shoulders were first propped up with pillows, etc. After the anæsthetic had been inhaled for a few minutes, and before she was well under its influence, the operation was commenced. She struggled, and seemed to feel the pain. Owing to the nature of the subsequent proceedings, but little of it could have been inhaled afterwards. As the bone was being wrenched away with the lion forceps, she suddenly ceased struggling and became pale. The removal was quickly completed, and artificial respiration was resorted to. The throat was examined for a foreign body, but none could be found. As considerable bleeding occurred it was frequently mopped out with sponges on holders. She never showed the slightest sign of revival.

At the necropsy, twenty-six hours after death, there was well-marked rigor mortis; and the head, neck, and upper part of the trunk were congested. The trachea and bronchi contained a little semicoagulated blood, loosely adherent to their walls; and blood could be traced, at some parts, even into the smaller bronchi. The lungs were healthy, except that their bases were congested behind. For such a thin woman, there was an unusually large amount of fat about the outside of the heart. To the naked eye, its muscular substance appeared healthy. The left ventricle was nearly empty; the right moderately full. In other respects, the heart was normal. The liver contained some hydatid cysts. The other organs presented no noteworthy changes.

CASE V.—As in the three preceding cases, this patient was a woman. Her age was fifty-three years, and she had suffered from cancer of the womb for the last eighteen months. Three weeks ago, subacute symptoms of intestinal obstruction came on, owing, as was believed, to adhesions between the gut and the womb. During the week preceding the present crisis, she had no action of the bowels; feculent vomiting was frequent; and she was unable to retain any food. Enemata, etc., gave no relief; therefore, it was decided to open the colon in the left loin. She was a large, pale, emaciated, and feeble person. The anæsthetic employed, and the mode of its administration, were precisely the same as in the last case. She died suddenly before the process was complete, and before the operation had been commenced.

At the necropsy, twenty-four hours after death, muscular rigidity was fairly marked. The heart was quite free from disease. The right ventricle contained a gelatinous clot, and the left auricle some fluid blood. Some of the feculent vomit was contained in the air-passages, and could be traced into the smaller bronchi in the upper and middle lobes of the right lung; the base of the left lung was deeply congested behind. The œsophagus was full of this feculent material. The parietes of the abdomen were enormously distended, owing, as it proved on dividing them, to the fulness of the intestines. There were signs of comparatively recent general peritonitis. The

omentum was adherent to the fundus of the uterus, and tightly stretched over the distended intestines. This distension was chiefly limited to the small intestines, which were full of fluid feculent matter; the cause of it was an obstruction of the bowel, at about six inches above the ileo-cæcal valve, where it was adherent to the uterus, only a very small passage still remaining open. A second obstruction, effectually preventing the passage of solid faecal matter, existed in the sigmoid flexure of the colon, which was also adherent to the uterus. The transverse colon was distended with flatus. With the exception of the fundus, almost the whole of the uterus had been destroyed by cancerous ulceration; and its place was occupied by a sloughing cavity, communicating with the vagina. The right kidney weighed only two and a quarter ounces; it was small and sacculated; very little of its secreting structure remained, and its ureter was dilated. The left kidney was normal; and so were the other organs examined.

CASE VI.—The last case I have to relate is that of a farm-labourer, aged 44, who had cancer of the right side of the tongue, encroaching somewhat on the soft palate. The disease had invaded the glands of the neck, especially those of the right side; and it was of nine months' duration. It had previously been excised, and subsequently destroyed by the galvano-cautery—only to return again, however. On account of the advanced nature of the disease and the impossibility of completely extirpating it, further operative treatment was not advised; but, subsequently, at the patient's urgent request, it was decided to remove the tongue and as much of the disease as could be got at. His general health was fairly good, though he was somewhat emaciated. Having been propped up, in the position usual for such operations, the mixture of chloroform and ether was administered, exactly as in the two preceding cases. Only partial anaesthesia was induced, with a view of obviating the ill effect of anticipated hæmorrhage. A gag was then introduced into the mouth, and the right cheek was slit freely open. The wire loop of the *écraseur* was next passed round the base of the tongue, behind curved-handled needles previously introduced. As soon as the *écraseur* was tightened up, the patient became pale, and ceased breathing. A few hasty turns of the screw sufficed to complete the removal of the tongue. The throat was mopped out with sponges, and examined for a foreign body, but none could be detected. Artificial respiration, tracheotomy, and galvanism were resorted to; but the patient could not be revived.

At the necropsy on the following day, rigor mortis was present, and the integuments were pallid. The lungs were firmly bound to the chest-walls by old adhesions. They were emphysematous and congested at their bases, but crepitant throughout. The trachea and larger bronchi contained some blood and mucus; and blood could be traced into the smaller bronchi, especially in the lower lobes. The right side of the heart contained a large quantity of dark semi-clotted blood, and the left side contained some fluid blood. The right ventricle was dilated; the left contracted. The valvular apparatus and the muscular substance were normal in every respect. The kidneys were large and congested, but otherwise healthy. There was nothing abnormal about the other organs examined.

I have observed that those who administer anaesthetics too often, do so without any fixed principles to guide them. This is lamentable, because, as many of these cases show, the fundamental laws of the anaesthetic art cannot be disregarded without entailing a deplorable sacrifice of life. I will here endeavour to state, in the briefest manner possible, what I consider to be the most important practical inferences to be drawn from them.

With regard to chloroform, then, subject to the attainment of the object in view, too much air cannot be given during its administration; and with regard to ether, too little air cannot be given during its administration. From this it follows, that a long time is required to induce anaesthesia by chloroform; but to produce the same result with ether, a short time is sufficient. Now, by a long time, I mean about a quarter of an hour, and by a short time, about five minutes.

Surgeons are not unfrequently to blame in this respect. How often one has heard it said to the chloroformist—"Be as quick as you can; I want to begin the operation in *five minutes*." In my opinion, this is equivalent to saying—"Kill at least 1 per cent. of my patients." Those inhalers are the best which most readily facilitate the fulfilment of these requirements. For giving chloroform, one with a wire framework, having a diaphragm of flannel, or some similar material, stretched over the top of it, on which to evaporate the anaesthetic, but open at the sides, would be very good; but a piece of lint, or the corner of a towel, properly used, would do as well. A graduated drop-bottle is neces-

sary in any case, as only a small quantity of chloroform should be poured on at a time, and this requires to be frequently renewed. For the administration of ether, Ormsby's inhaler seems to me the best; it was designed to fulfil the requirements just mentioned, and I have found it answer admirably.

There is only one other point I will now mention, and that is the importance of watching the respirations during the process. To do so properly, of course the epigastrium must be uncovered. It is of much greater value than feeling the pulse, since, when the latter stops, there, as a rule, is an end of the patient. Mr. Lister has very ably insisted on this. However, I have found it generally neglected at King's College Hospital.

ON THE OXYTIC ACTION OF QUININE, AND A METHOD OF PREVENTING IT; WITH CASES.

By NEIL MACLEOD, M.D. Edin., Shanghai.

DOES quinine excite contractions in the human pregnant uterus? Schröder, in his last edition of his *Lehrbuch der Geburtshülfe* (T. Auflage, Bonn, 1882, S. 484), regards this action of quinine as "problematic," and cites a number of authorities in support of this view. This question is of great interest to medical men residing in malarious districts, who are frequently called upon to treat neuralgia and fever of malarial origin in pregnant women, and has been answered in the affirmative by French, Italian, and more particularly German and Indian medical men; and in the negative chiefly by American physicians, who maintain that abortion after quinine given in malarial poisoning, is the result of the latter.

There are some difficulties which stand in the way of settling this question, but these may be set aside. Fever itself is known to stimulate the pregnant uterus to contraction so effectually, at times, as to cause abortion, but the fallacy which this involves may be avoided by observing the effect of repeated doses of the drug, as I was enabled to do in some of the cases recorded below. Cases of neuralgia are free from this objection.

In the later months of pregnancy, when the uterus is above the pelvic brim, pains can be easily ascertained by palpation to be accompanied or not by uterine contraction; but in the early months, it is practically impossible to ascertain the existence of these contractions; and the subjective pains cannot be accepted as sufficient evidence of uterine action, even in pluriparae, unless accompanied by blood discharge from the uterus. On the other hand, it is quite possible that many examples of this effect of quinine have been overlooked; as where "pains" have been present, but have not been severe; have been unaccompanied by blood discharge, or not followed by miscarriage or abortion; moreover, it is not unlikely that the use of opiates, in neuralgic cases, has interfered with the observation of the ecboic effect of the drug, a conjunction of remedies well illustrated in Cases II, III, and IV, recorded below.

The ordinary use of opiates in threatening miscarriage, suggested to me their administration before that of quinine in such cases, and the result was so encouraging in Case II, that I have, since then, used opium, morphia, and chlorodyne for this purpose, in several cases, and have now no hesitation in prescribing large doses of quinine to pregnant women suffering from malarial fever or neuralgia, or to reduce high temperature in other conditions. It is said that, in India, large doses of quinine are generally avoided in these cases, from fear of uterine disturbance (*Berliner Klinische Wochenschrift*, September 11th, 1882, S. 563), and, on inquiry, I find that a similar practice is generally prevalent amongst my colleagues in China. Hausmann (*Ibid.* S. 564) records a well-marked example of uterine contraction following the use of quinine in a case two months advanced in pregnancy, and expresses his accordance with the views of Hehle and Cochran, that the subjects most likely to be affected in this way are delicate, nervous women, wasted by a chronic ailment, and with a history of miscarriage. Hausmann concludes his paper with the remark, "since even a large dose (fifteen and twenty grains) only excited fleeting contractions of the uterus in my case, in spite of well marked predisposition, a therapeutic dose (which, however, he does not define), may be accompanied by excitation, or increase, of pains in still weaker persons, or by miscarriage with a very large dose." I regard fifteen grains as an ordinary "therapeutic" dose in malarial fever, such a dose having frequently to be followed by a still larger one to arrest the disease.

CASE I is only interesting as being probably predisposed to this effect of quinine. A thin, delicate, nervous primipara, at the com-