

some of the fluid. From the nature of things this is less likely to happen in puerperal than in non-puerperal cases, nevertheless, it is one's duty to guard against the possibility of it in any case. With this view I adopted a simple expedient a few days ago in a case here, which may be worth mentioning, as it possesses the merit of simplicity if not of originality, and is within everybody's reach.

It was necessary to wash out the uterus in a puerperal case in the Female Hospital, where there was hypogastric tenderness and foetid lochial discharge. The tube of the syringe was introduced into the uterine cavity, and side by side with it a No. 12 gum elastic male catheter, the lotion, carbolic 1 to 60 parts, was injected gently, and nearly, though not quite as fast, it returned through the catheter and was received into a vessel placed under the end of the catheter for the purpose. It seemed to answer capitally. There was some stasis of the fluid in the uterine cavity as the tube for carrying it off was not as large as that which introduced it, but this was rather an advantage than otherwise, since there was no chance of its retention.

Mysore, September 7th, 1883.

ON THE PHYSIOLOGICAL AND MEDICINAL ACTION OF HYDROFLUORIC ACID AND THE FLUORIDES.

By SURGEON L. A. WADDELL, M.B.,

Resident Physician, Medical College Hospital, Calcutta.

(Continued from page 317.)

In Aneurism and Cardiac Disease.—In aortic aneurism fluorine may be admissible on account of its property of combating vascular fulness; but in endeavouring by its aid to relieve the arterial tension, care must be taken not to induce such an advanced state of anæmia as will aggravate those degenerative changes, to which the aneurismal swelling partly owes its origin. It will also be obvious that the dose must be sufficiently small to avoid the possibility of vomiting. Fluorine is unlikely to assist in the removal of material which is actually effused and organised.

In mitral disease the use of these drugs must be invariably bad, for they weaken the heart, and have none of the tonic and stimulating properties which render digitalis of such value in this affection. In aortic disease the ultimate effect would be to dangerously aggravate the low arterial tension which obtains during the ventricular diastole.

In Chronic Malarial Enlargement of Spleen.

—From the reputed efficacy of hydrofluoric acid in goitre Dr. Coates was led to try the effect of fluorine on enlarged spleens, in the belief that the spleen as a blood gland might be similarly affected by a drug which acted on the thyroid gland. And he found that when ammonium fluoride was given in small doses for a time to patients with chronic malarial enlargement of the spleen, in nearly all the cases the enlargement was reduced in size, and in many cases altogether disappeared. The six cases given by him* may be thus summarized:—

CASE.	Size of Enlargement	Consistency.	Days under Treatment.	Amount of Drug taken.	Result on the Enlargement.
1. R., Hindu male, æt. 16 ..	Lower border midway between umbilicus and iliac crest.	hard	19	10 grs	Reduced one-half.
2. L., do., æt. 32 ..	l. b. 5 inches below costal arch.	do.	40	35 "	Reduced two-thirds.
3. J.S., Eurasian male, æt. 13	l. b. 2½ inches below costal arch.	soft	35	10 "	Altogether removed.
4. T., Hindu male, æt. 20 ..	l. b. midway between umbilicus and iliac crest.	hard	63	43 "	Reduced one-third in breadth and one inch in depth.
5. G., do., æt. 22 ..	l. b. 3 inches below ribs.	do.	12	7 "	Reduced one-third.
6. A., do., æt. 12 ..	l. b. 3 inches below ribs.	soft	7	3 "	Altogether reduced.

Many practitioners in Calcutta have also successfully employed this fluoride in their practice; and I myself have seen the enlarged spleen become reduced with unusual rapidity under the use of hydrofluoric acid and the alkaline fluorides.

Sufficient evidence seems to have been accumulated to show that under the fluorides, these enlargements become readily reduced in proportion to their softness, and relatively recent origin. The cases which resist reduction most are hard fibrous enlargements of several years' duration. And should the intermittent fever return during the continuance of the fluorides, the tendency to further splenic enlargement is found to be in no way apparently modified.

But it must not be forgotten that on the cessation of the febrile attacks the splenic enlargement in proportion to the recentness of its origin tends to get less without special treatment. And this tendency will be increased should the administration of cinchona alkaloid or quinine be persisted in for a time. At present, therefore, the exact extent of the part played by fluorine in reducing the enlargement cannot be considered as being fully defined, for, on the one hand there is an absence of precise information as to the rate at which the spleen becomes reduced without having recourse to the fluorides, and on the other hand an extensive collection of carefully recorded cases in which the fluorides have

* loc. cit.

been given, with the results of such treatment, is still a desideratum.

In treating cases of enlarged spleen by fluorine, it is to be remembered that the reduction of the enlargement is only to be effected at the expense of considerable general anæmia. And as the subjects of splenic enlargement are already suffering from more or less grave anæmia, it becomes a question of serious importance how far we can safely proceed with the use of these drugs without aggravating the condition we wish to relieve. For a state of debility and increased anæmia is apt to determine fresh attacks of intermittent, which are duly attended by further increase in the bulk of the spleen. We would then have the spleen as enlarged as before, and in addition the super-added debility resulting from the fluorine anæmia, so that the patient altogether would be in a worse condition than before.

The use of fluorine therefore, in cases of splenic enlargement, must be carefully regulated and its effects watched. As iron neutralizes its action the iron fluorides are of no medicinal value. Quinetum fluoride (or better still quinine fluoride) seems to be the best salt of fluorine for the treatment of enlarged spleen, as its quinetum element, while warding off a recurrence of the fever, may also aid in the reduction of the enlargement. Fluorine is contra-indicated in every case where grave adynamic symptoms are present.

DOSE AND PREPARATIONS.

Of the acid, Dr. Woakes gave 15 minims to 2 drachms of a $\frac{1}{2}$ per cent. solution* thrice daily. The $\frac{1}{4}$ per cent. solution used by me contained $\frac{1}{4}$ grain of anhydrous acid in every 100 grains of the solution, and thus one drachm of it represented about $1\frac{1}{2}$ drachms of Dr. Woakes' acid. Of this $\frac{1}{4}$ per cent. solution the dose should be 10 minims to 2 drachms. Vomiting is excited by $\frac{1}{2}$ ounce. Unless kept in guttapercha bottles, it is desirable to have the solution weaker than either of the above, to prevent loss of strength by combination with the silica of the glass.

But, as we have seen, there is no peculiar medicinal advantage to be gained by the use of the acid in preference to the alkaline fluorides, for the characteristic action of fluorine is equally brought about by these salts, which moreover have the great advantage over the acid of being capable of preservation in glass bottles for a long time. The ammonium fluoride is least easily preserved in this way, for it tends to part with its volatile base, and becoming an acid salt attacks the glass. A watery solution of ammonium fluoride (4 grains to 1 oz.) if kept in glass bottles uncoated with wax becomes in a short time partly decomposed, with the formation of a semi-transparent hazy precipitate of silico-fluoride, which being insoluble is medically inert.

Of the alkaline fluorides the dose is from $\frac{1}{4}$ grain to 3 grains. When given in doses of 6 grains and upwards emesis results. As the ammonium fluoride contains the largest relative amount of fluorine, it should be given in somewhat smaller doses than the

sodium or potassium salts. Extract of liquorice effectually disguises any slight taste the salt may possess; but the real difficulty is not the mere matter of rendering the drug palatable, but the counteracting of the nauseating after-effects, which follow on the introduction of the medicine into the stomach. Dilution and giving after food somewhat relieve these symptoms.

INCOMPATIBLES.

Neither the acid nor the alkaline fluorides should be given with lime or lead salts as insoluble precipitates are thrown down. The fluorides having a great tendency to form acid salts with even the weakest acids, should not be prescribed with citric, tartaric, or other organic acids.

ANTIDOTES.

In cases of poisoning by the strong acid, the treatment would in no way differ essentially from that of poisoning by the other concentrated mineral acids:—emollients, lime, &c., should be given.

If the fluorides be taken in poisonous doses they are likely to prove their own emetic. To combat the anæmia resulting from the fluorine preparations, iron would be indicated.

GENERAL SUMMARY.

1. On account of the corrosive action of these substances on glass vessels their use in ordinary therapeutics seems beset by many difficulties. But by attending to a few precautions these obstacles can be so minimized as to be practically overcome.

2. The topical action of strong hydrofluoric acid differs from that of the other concentrated mineral acids in being attended by more acute pain. If allowed to remain in contact with the skin for a considerable time, by combination with the lime and other bases of the tissues it forms a hard horny sheath, under cover of which it continues to penetrate the deeper tissues till its energy is expended. On removal of the slough the resulting ulcer manifests a readiness to heal scarcely inferior to that produced by oil of vitriol.

3. In poisoning by the strong acid the treatment must be regulated on the same fundamental principles as in poisoning by any of the other strong mineral acids.

4. The fumes of the acid on inhalation provoke dyspnoea and spasmodic cough, and if concentrated, produce intense bronchial and laryngeal irritation, with spasm of the glottis, convulsive cough, and in some cases speedy death. After even a short exposure to the fumes death may result from the secondary inflammatory action in the larynx, finer bronchi or lung substance. The inflammatory action seems to have nothing distinctive in itself. These dangerous and even fatal effects offer a powerful argument against the treatment of diphtheria by inhalations of this acid, as advocated by M. Bergeron.

5. The alkaline fluorides are not absorbed through the skin.

6. The remote action of the alkaline fluorides is essentially similar to that of the dilute acid, the super-added effect of the base becoming apparent only when the salts are given in large doses. These

* This was a solution made from the strong 30 per cent. acid.

salts, possessing as they do, the characteristic therapeutical properties of fluorine, are to be preferred to the acid for ordinary medicinal use, seeing that they have the material advantages of being more easily preserved and dispensed.

7. Fractional doses after a time slightly impair the appetite. Moderate doses induce nausea and tend to disorder the stomach. Large doses readily excite vomiting by direct irritant action on the gastric mucous membrane—no vomiting occurs on subcutaneous administration of the drug, and free dilution diminishes the emetic tendency. No purgative action ordinarily attends the use of the salts even in large doses.

8. Nutrition is impaired by the prolonged ingestion of small doses of the alkaline fluorides or the acid, and this atonic condition is accompanied by slight loss of body-weight—the slightly depreciated appetite may partly account for this condition. The extensive and constant presence of fluorine in infinitesimal quantities in most of the animal tissues and secretions need not necessarily imply that it is connected with the well-being of nutrition, for its wide diffusion throughout the vegetable and mineral worlds necessitates its ingestion with the food, and would thus account for its general presence within the animal body.

9. The amount of urea excreted in the urine is increased, implying increased destruction of tissue. That the excessive elimination of urea is not due to an increase in the general tissue waste, seems evident from the fact that the body-temperature is distinctly reduced, the pulse-rate somewhat slowed, and the arterial pressure slightly lowered.

What then is the tissue which being destroyed in excess furnishes this increased ureal excretion?

10. Observation showed that the alkaline fluorides and the acid profoundly modify the constitution of the blood, producing an anæmia (oligocythæmia), the essential characteristic of which is that the red corpuscles suffer a decrease out of all proportion to the hæmoglobin. The extent of this numerical reduction of the red corpuscles, even when small doses of the drug are given, is very great, but with large doses the corpuscular loss becomes enormous. Thus with the provers after a five-days' course of the drug, the general loss averaged about one-fourth of the total red corpuscles, and the induced anæmia was visible to the unaided eye. As the blood becomes impoverished the rate of decrease becomes slower; and on stopping the drug the red corpuscles more or less rapidly approach their normal standard.

The anæmia cannot be ascribed to anorexia, as an extensive reduction occurs under the use of doses so small as not perceptibly to derange the appetite.

The hæmoglobin is only slightly reduced in amount; and as at the same time the size of the red disc becomes slightly larger, it will thus be able individually to take up a greater amount of hæmoglobin than normally. In the relatively slight decrease of the hæmoglobin under their use, lies the comparative safety of these substances as possible remedial agents; for should the hæmoglobin, on which the functional activity of the corpuscles so largely depends, have been diminished in ratio at all similar to the corpuscular decrease, a much more grave anæmic condition would

be established, and one which would have opposed a serious obstacle to the advisability of their employment in medicine.

11. Having established the fact of there being an enormous numerical reduction of the red corpuscles under the use of these drugs, we were led to ascertain the probable cause of this reduction; and by a process of exclusion, in so far as dealing with this somewhat problematical subject permits, we seemed to find that the corpuscular loss resulted from the undue stimulation of the disintegrating function of the spleen.

This conclusion is supported by several circumstances, chiefly pathological, and although the lessons of pathology are necessarily less certain than experimental observation, in the absence of the latter they afford much valuable information. On these drugs being given in small doses to patients with malarially enlarged spleens a decided reduction in size occurs, and in many cases the enlargement disappears. A consideration of the nature of the chronic enlargement led to the belief that it is not a pure hypertrophy, but in great measure a congestion—the vascular areas being enormously distended with blood; and that the functions are generally diminished or inactive, and not, as is usually stated, increased. The reduction of the enlargement was found to be intimately associated with the corpuscular decrease, and occurred most extensively and rapidly in cases of soft enlargement, that is to say, in cases where the increased volume in a great measure depends on simple distension with blood. While on the other hand, mere loss of blood *per se* would not account for the reduction, because in many cases complicated by piles and dysentery, large hæmorrhage occurs from the bowel without the slightest reduction in size of the enlarged viscus.

It seems therefore probable that in the malarially enlarged spleen, where the function of disintegration of the red corpuscles in common with the other functions is inactive or depressed, the exhibition of fluorine by stimulating this function reduces the total volume of the contained blood, and by thus relieving the organ of a principal cause of the swelling enables the muscular fibres to regain their normal activity and so contribute towards the further reduction of the enlargement.

12. Toxic doses affect frogs in a generally similar manner to warm-blooded animals: experiments therefore on the former afford results of much practical value.

13. Circulatory depression is a constant and characteristic effect of fluorine compounds. The cardiac contractions are slowed and weakened, and with poisonous doses the heart is arrested in diastole. The contractions are found to be arrested a considerable time before the contractility of the cardiac muscle to mechanical stimuli is lost. Thus showing that fluorine acts more powerfully on the nervous mechanism which regulates the contractions than on the muscular tissue itself.

Under full medicinal doses the sphygmograph shows after a time a distinct reduction of blood-pressure.

14. Increased frequency of the respiratory act follows the injection of poisonous doses of the drug.

The respirations soon become retarded, slightly irregular and evidently laborious. The respiratory difficulty increases, and the inspiratory efforts ultimately become convulsive (asphyxial) in character. The imperfect aëration of the blood thus induced appears to contribute to the cardiac paralysis which is the immediate cause of death.

15. Even in the largest medicinal doses no narcotic effect, nor even drowsiness results. In toxic doses the pupils at first become slightly dilated, then afterwards markedly contracted. Voluntary movements cease only a few seconds before the final arrest of the respirations and general circulation. The medulla appears to be specially affected. The spinal reflex irritability persisted throughout unimpaired. The voluntary muscles retained their electric excitability for some time after death.

16. The salivary secretion is very slightly increased, especially after large doses which excite nausea. The absorbent glands do not appear to be stimulated. The bulk of the urine is slightly increased, the increase being most marked after the drug has been given for some time and in large doses.

17. Medicinally, large and even moderate doses are attended by such unpleasant symptoms as to render it difficult to prevail upon patients to persist for any length of time with the use of fluorine compounds in any but fractional doses.

18. In epilepsy these drugs are of no value; and in phthisis pulmonalis, mitral disease and aortic regurgitation they are positively hurtful.

19. In rickets the bones are found to be deficient in fluorides, and the administration of minute doses of fluorine salts is reported to be of benefit in this disease.

20. Fluorine has no sedative effect whatever on the articular pains of acute rheumatism. The reputed efficacy of potassium fluoride over the pains was entirely due to the basic element of the salt. As fluorine powerfully weakens the heart, its use in acute rheumatism is dangerous.

21. In soft vascular goitres fluorine is of use, if persisted in, but the reduction seems to be a consequence of the general anæmia induced by fluorine, rather than the result of any special action on the cervical sympathetic.

22. In plethoric states, such as gout, fluorine may be admissible; also, for relieving vascular fulness in the earlier stages of aortic aneurism.

23. In the chronically enlarged spleen of malaria, when of recent origin and soft consistency, reduction in size readily occurs under the fluorides; but this is only effected at the expense of considerable anæmia. These drugs are powerless to prevent or hinder further enlargement resulting from fresh paroxysms of the intermittent. The fluoric anæmia must be carefully watched and prevented going too far. Iron fluoride is of no value. Quinetum or Quinine fluoride is best. Fluorine is contra-indicated in every case where grave adynamic symptoms are present.

These observations in affording definite ideas as to the characteristic action of fluorine compounds, also indicate the direction in which these powerful drugs are likely to prove of service as remedial agents. It now remains for a more extend-

ed clinical experience of these substances to determine whether or not the peculiar disadvantages incidental to their medicinal use will prove insuperable obstacles to their ordinary employment in practical therapeutics.

A MIRROR OF HOSPITAL PRACTICE.

CASE OF OCCLUSION OF THE VAGINA: OPERATION.

By P. S. MOOTOOSAWMY, G.M.S., F.L.S.,

Fellow of the Obstetrical Society, London,

Retired Native Surgeon, Tanjore.

A Brahmanee, aged 40, married, mother of seven children, of fair complexion and delicate make, resident of a village 30 miles east of Tanjore, placed herself under treatment on the 2nd February 1883, complaining of occlusion of the vagina after a severe labour in her last or seventh confinement two years ago. She attributed her condition to the mal-treatment received from the midwives in attendance, and stated that for the last two years she has had no menstrual discharge, though the periodical molimina have not been absent. During this period she says her sufferings are great.

When she applied for advice, she complained chiefly of difficult micturition, obstinate constipation, relieved only by purgative medicines, want of appetite and sleep. She had been treated by native practitioners without relief.

On examination the external organs of generation were found perfect, excepting that the entrance to the vagina was completely closed by a cicatrix which had a soft feel. The uterus was felt above the pubes as a hard irregular tumour. The urethra admitted of the introduction of an ordinary female catheter.

The patient stated that her last labour, two years ago, was a very severe one, and that she suffered much for three days. She was told it was a case of fooling presentation, and she blames the rough treatment she underwent at the hands of three native midwives, who were in attendance, for her present unfortunate condition. From the force used by these women to effect delivery the body of the child had been severed from the head, which was extracted piecemeal on the following day. She suffered much and long, she says, from the violence used by the women on this occasion.

The patient further stated that after each of her previous confinements the menstrual function was restored in two years, but that on this occasion it appeared to return in the fourth month after delivery. There having been no outlet for the discharge, she suffered from severe abdominal pain and distension, which continued for four days. These symptoms have since regularly presented themselves once a month, and her sufferings had become so great that she was at last induced to apply for treatment.

It was determined to relieve her by operation, and this was performed on the following day. The bladder and rectum having been emptied, the patient was placed on the table in the position for lithotomy, except that the hands were not secured to the ankles.

Chloroform was administered, and as soon as the patient was under its influence the operation was commenced by perforating the centre of the obstructed portion with an ordinary trocar. The instrument was pushed in to the depth of two inches, and the opening enlarged by a crucial incision with a scalpel. This admitted the forefinger of the right hand, and I was enabled to discover by it that a hard cicatrix existed about an inch further on, which firmly resisted the finger, and would not permit of the passage of a three-bladed speculum. Two deep incisions were then made on the sides and few cicatricial bands, which were near the posterior extremity of the vagina, were freely divided. I was thus enabled to reach the os uteri, and introduce an uterine sound. A large quantity of dark thick viscid fluid escaped, the flow being increased by pressing on the uterus. In all about twenty ounces were discharged, causing the irregular tumour-like appearance of the uterus to vanish. The vagina was washed out with a solution of carbolic acid, and plugged with lint steeped in carbolic oil.