been for the time taken up in washing out the bladder and by the cystoscopy, the main operation could easily have been done by this means alone. A small impacted calculus was found in the lower end of the pelvis of the kidney. With the exception of a single vomit fifteen minutes after injection, there were no after-effects of any kind. Pulse remained at 90 and respirations at 20 throughout; there was no shock, and patient was well and comfortable next day.

CASE XVIII.

R. T., aged 48, admitted for an irreducible inguinal hernia of gigantic proportions. In circumference it measured 35 in., and it depended to a point 16 in. below the pubic spine. The patient was a stoutly-built but rather plethoric man, and the risk of so prolonged an operation as would be required was fully pointed out to him. He begged that something might be done, since not only could he obtain no employment, but also the weight of the gradually increasing mass made it impossible for him to get about. He very pluckily agreed to take any risk, and this rather against my advice. Three weeks were spent in getting rid of some oedema of the scrotum and endeavouring to lessen the size of the mass, and then operation was performed. The injection was given in the right lateral position, and consisted of 7 cg. stovaine + 1 mg. strychnine given in the dorsi-lumbar interspace. The patient was put in the Trendelenburg position not only to cause the solution to rise in the theca, but also that gravity might assist in the return of the hernial contents. The analgesia rose to the nipples. On opening the sac, it was found to contain the caecum, appendix, ascending and transverse colon, 10 to 12 ft. of ileum, and a large mass of omentum. The latter was removed painlessly, and I then began to attempt to return the bowel. At the end of nearly ten minutes I had made little progress, and the patient was complaining of "pain in his chest" and had vomited twice; his pulse and respiration were both good. Chloroform was therefore substituted, very little being required to keep him fully under. Ultimately by returning the bowel inch by inch from the distal to the proximal end I succeeded in reducing the whole of it. As he showed no signs of shock I separated the neck of the sac from its surroundings without attempting to remove the body and fundus, and closed it. I then implanted two silver wire filigrees by the method I have elsewhere described,² closed the wound, and returned the patient to bed. As regards the analgesia there is nothing further to note; it failed, as so frequently happens where intestinal operations are concerned, to overcome the sensation of dragging and nausea. For any other than such operations it would have been ideal. As I had feared, the interference with the bowel proved to be too much for the patient; paralytic ileus set in twenty-four hours later, and in spite of a caecostomy done under local anaesthesia, the distension increased and he died from embarrassed respiration and oedema of the lungs. No pathological change of any sort was found in the spinal cord or meninges. Although I hesitated to perform this operation on account of the risk, I was encouraged to hope it might be successful, owing to the fact that three years ago I operated upon, and succeeded in curing by the double-filigree operation, a patient whose hernia almost exactly resembled the one here described, and which measured 25 in. in circumference and 15 in. in length. The operation was done under spinal analgesia.³

These, then, are the results I have obtained by the use of Jonnesco's combination, and it must be confessed that as a whole they are disappointing. The four successful cases of high puncture serve, so far as analgesia above the phrenics is concerned, to show that the method has, at least, some element of possibility in it; it is, however, uncertain, imperfect at present, and of doubtful value in replacing general anaesthesia. The unsuccessful cases of high puncture show it to be fraught with danger, and from the humane standpoint unjustifiable. The cases of low puncture serve to show very little else than that strychnine can be injected into the spinal canal without producing spastic symptoms, and that it undoubtedly results in a shortening of the period of analgesia usually resulting from the use of stovaine alone. The effects of the analgesic on the cranial nerves appear to be irregular. So far as I have been able to see, the first, second, third, and fourth remain unaffected; the fifth is at times under control, as is also the seventh; the sixth, eighth, ninth, tenth, and twelfth are unaffected, while the eleventh may or may not be paralysed. That the four last nerves should escape when the trigeminal is affected is a very remarkable fact, seeing that, lying in that portion of the base of the skull to which the injection has most ready access, they must of necessity be bathed in the solution.

It would certainly appear proved by Cases VI, XIV, and XV that stovaine is not a cardiac depressant, although it is to some extent a vaso-dilator, as shown by the slight fall of blood pressure which has been noticed in some of the 500 odd cases of spinal analgesia carried out in my wards at Greenwich.

I can see no object in adding strychnine to cases of low spinal analgesia, since I have found no difficulty in

carrying out operations under stovaine analgesia without it, even when such analgesia has been pushed to the level of the clavicles. I do not mean by this that such a height is to be aimed at; even in skilled hands it is of doubtful safety; but, even if strychnine has been added to the stovaine to make it safer, it is still impossible to rely upon it in any particular case, and it is precisely this fact which has compelled me to forego the further use of Jonnesco's method. The idea it has in view is splendid, but to be of use it must show a high percentage of safety, and this condition it does not at present fulfil.

The above remarks, it must be remembered, apply solely to cases done by the stovaine-strychnine method, the results of which must not be confounded with those of the stovaine-glucose method of Barker. Of these latter cases, considerably over 500 have now been done in the wards of the Seamen's Hospital with perfect satisfaction to the patients, to myself, and to those of my colleagues who have given it a trial. I may say here that in this series, which extends over a period of three years, no case has as yet been met with in which there were alarming or dangerous symptoms either during or after operation; while the simplicity of the method, the comfort of the patient on the table, the immunity from unpleasant after-effects, and the saving of time which it ensures, combine to make it the method of election in cases suitable to its use. It is to me a matter of regret that I have been compelled, owing to the requirements of the authorities of the Naval Medical Service, to employ general anaesthesia in a certain proportion of my cases, in order to furnish material for classes of instruction in anaesthetics, to members of that service taking out courses in the London School of Clinical Medicine. That spinal analgesia is not yet a recognized branch of anaesthetics is to my mind, certainly so far as the Naval and Military Medical Services are concerned, a great misfortune, since it is in these services especially that spinal analgesia must find its highest sphere of utility.

REFERENCES.

¹ BRITISH MEDICAL JOURNAL, 1909. ² *Ibid.*, August, 1909. ³ *Ibid.*

Remarks

ON

ANAESTHETIZING PATIENTS FOR OPERATIONS ON THE THROAT, NOSE, AND ACCESSORY SINUSES.

BY

STUART V. STOCK, M.B., B.S.LOND., F.R.C.S.,

SENIOR ASSISTANT ANAESTHETIST TO THE BRISTOL ROYAL INFIRMARY.

THE increasing importance attached to anaesthetics, and the recognition of the fact that the anaesthetic is not the least important part of any surgical procedure, has prompted me to publish the following method, which I employ for anaesthetizing patients during operations on the throat, nose, and accessory sinuses. I have used the method for nearly four years, and lately its scope has been extended to operations on the mouth, face, and neck. The following article, however, is more particularly intended to apply to its adaptation to throat and nose work.

The routine method of anaesthetizing I employ is to induce anaesthesia with ethyl chloride and ether, and then after a varying time to substitute what we in Bristol call the "two-bottle" method—namely, a plain domette-covered mask (Murray's) and two drop bottles, one containing chloroform, the other ether. These two anaesthetics are added to the mask in such quantities and at such intervals as may be thought necessary, the smallest possible amount of chloroform being used, and at times altogether omitted, resulting in a pure, open ether administration. This method is superior to using a definite mixture of the two drugs, as the proportions can be so easily varied to suit individual cases.

On this method is based the one now to be described.

Anaesthesia is induced by ethyl chloride and ether, and maintained by ether vapour delivered to the patient

through a mouth tube from a Buxton's bottle of suitable size, with or without the addition of chloroform vapour from a second Buxton's bottle.

APPARATUS.

The apparatus, which is very similar to that of Mr.

Fig. 1.—Apparatus complete. Hand blower attached.

Walter Tyrrell,¹ consists of two Buxton's bottles, held in a light stand. (Fig. 1.)

One bottle, for the ether, is a 4.5 cm. internal diameter, and deep enough to allow the surface of the ether to be maintained at least 6 cm. above the opening of the air inlet tube.

The second bottle, for chloroform, has the same internal diameter, and gives a column of chloroform 3.5 cm. above the opening of its air inlet.

These measurements I determined by experiment as being the smallest capable of supplying the amount of vapour required.

The inlet tubes of the two bottles are attached to a Y tube, through the stem of which air enters from the bellows. The exit tubes are similarly connected to a second Y tube, from which an india-rubber pipe conducts the vapour, or mixed vapours, to the patient.

I found from experience that the angle made by the limbs of the Y tube with each other was of some importance; it should not be greater than 58 degrees. Each limb must be provided with a stopcock, but to facilitate manipulation, instead of the usual small butterfly handle a straight one, 2.5 cm. long, should be fitted to each tap.

Into the angle formed by the limbs of the delivery Y tube is soldered a short pipe, 4 mm. internal diameter, provided with a stop-tap. This is connected to an oxygen cylinder, so that the gas may, if necessary, be given in conjunction with the anaesthetic. (Fig. 3.)

Another point I think of importance is that nowhere should supply or delivery tubes be of less than 3 mm. or more than 5 mm. internal diameter.

SOURCE OF THE AIR SUPPLY.

I at first worked with an ordinary hand blower with a bulb of 100 c.cm. capacity. This required the constant use of one hand, and occasionally failed to supply sufficient vapour. I then tried a foot blower made by Brown of Leicester, which has proved itself capable of any demand made on it. Its capacity is 305 c.cm., but worked in the

ordinary way with the foot each compression gives an average of 260 c.cm. of air. The advantage of the foot blower is that both hands are free, and there is a large reserve of power if wanted.

Fig. 2.—Watson Williams's post-nasal plug forceps and tongue hook.

THE GAG AND CHLOROFORM MOUTH TUBES.

The gag I use is of Doyen's pattern, but the toothplates are covered with soft lead.

This prevents any damage to the teeth and obviates the risk of the ordinary rubber covering getting loose in the mouth. To each toothplate of the gag is attached a chloroform tube; it may be thought that this renders the gag slightly large, but it has this advantage—the tubes are always ready and cannot get lost.

That part of the chloroform tube attached to the toothplate is 3 cm. long, thus allowing it to project well into the mouth beyond the end of the toothplate, and ensuring the stream of anaesthetic vapour being carried well back towards the pharynx. The outer ends of these tubes are carried along parallel to the arms of the gag to keep them as much as possible out of the way. Fig. 2 will, I hope, make the form of both gag and tubes clear.

Fig. 3.—The delivery Y-tube showing oxygen tube in centre. (Note.—The handles advocated are not attached to this tube.)

HOW TO MAINTAIN THE APPARATUS AT A CONSTANT TEMPERATURE.

A few trials of the apparatus showed that some means would be required to prevent the ether bottle freezing. Water vapour from

the air condenses in the ether, and, freezing, soon blocks the air inlet. I tried several plans, and finally found that standing the whole apparatus in a basin of cold water was sufficient to maintain the temperature of the ether bottle. This simple expedient absolutely prevents freezing, whilst without it the bottle is rendered useless in a very short time.

THE PERCENTAGE STRENGTH OF THE VAPOUR GIVEN OFF BY THE APPARATUS.

I made experiments to determine the percentage strength of the vapour delivered to the patient. They were made under working conditions as follows: Measured quantities of air were first *drawn* and then *pumped* through the apparatus; the amount of chloroform and ether evaporated in each case was estimated by the difference in weight of the bottle before and after the air had been drawn or pumped through, and from the temperature and barometric pressure the vapour percentage was calculated.

EXPERIMENT I.

A definite quantity of ether was placed in the ether bottle.

The bottle was placed in a basin.

Air was blown through by the hand bellows—

A. With the basin empty;

B. With water in the basin reaching halfway up the ether bottle.

The results of two out of ten experiments are given.

No. 1.

A.—Basin Empty.

Air.	Result.
After 30,000 c.cm. ...	Bottle covered with frost.
After next 20,000 c.cm. ...	Ice in ether; small cone of ice under air inlet tube.
After next 10,000 c.cm. ...	Orifice inlet tube completely blocked with ice.
Total 60,000 c.cm. ...	Just over half the ether evaporated.

B.—Basin Contains Water at 8.5° C.

Air.	Result.
70,000 c.cm. ...	All ether evaporated; no sign of freezing.

No. 2.

A.—Basin Empty.

Air.	Result.
After 20,000 c.cm. ...	Bottle covered with frost.
After next 20,000 c.cm. ...	Ice in ether; small cone of ice under air inlet tube.
After next 20,000 c.cm. ...	Air inlet completely frozen.
Total 60,000 c.cm. ...	Exactly five-eighths ether evaporated.

B.—Basin Contains Water at 8.3° C.

Air.	Result.
60,500 c.cm. ...	All ether evaporated; no sign of freezing.

N.B.—Every endeavour was made to keep the rate of pumping as uniform as possible throughout.

EXPERIMENT II.

This was made to determine the effect of alterations in the rate of pumping on the quantity of anaesthetic delivered to the patient, and shows that increased rate of pumping causes a given quantity to be evaporated in a shorter time. This corresponds to what I found to be the case in actual practice—namely, that the quicker one pumped, the quicker the depth of anaesthesia was varied.

One chloroform and one ether result are given.

1. The apparatus was placed in water.
2. Measured quantities of the anaesthetics were placed in the bottles.
3. Air was blown through at a definite rate.
4. This was repeated under exactly similar conditions, except that the air was passed through at twice the previous speed.

Example I.

Anaesthetic.	Rate of Pumping.	Time to Evaporate Given Amount.
Chloroform	Slow pumping	Min. Sec. 28 50
Chloroform	Fast pumping	13 30

N.B.—Quantity of chloroform the same in both cases.

Example II.

Anaesthetic.	Rate of Pumping.	Time to Evaporate Given Amount.
Ether	Slow pumping	Min. Sec. 5 5
Ether	Fast pumping	3 20

N.B.—Quantity of ether in both cases the same.

EXPERIMENT III.

The ether bottle standing in water was filled to its working level.

Air was *drawn* through the ether 5,000 c.cm. at a time.

After each 5,000 c.cm. of air had been drawn through, the amount of ether evaporated, by weight, was estimated.

No.	Air.	Time.	Amount of Ether Evaporated.	Per Cent. of Ether in Air.
	C.cm.	Min. Sec.	Grams.	
1	5,000	5 52	7.8	33*
2	5,000	5 27	7.6	
3	5,000	5 7	7.0	
4	5,000	5 38	7.2	
5	5,000	5 13	6.8	
6	5,000	5 8	6.5	
7	5,000	5 2	6.1	
8	5,000	5 6	5.8	
9	5,000	4 52	5.2	
10	5,000	4 47	4.7	22

* The maximum and minimum percentages are alone noted.

The experiment was repeated under the same conditions, excepting that the air was *blown* through the ether, instead of being drawn through. It will be seen that in this way more ether was evaporated than when the air was *drawn* through. In each case every endeavour was made to bring the surrounding circumstances as near as was possible to those of actual practice.

No.	Air.	Time.	Amount of Ether Evaporated.	Per Cent.
	C cm.	Min. Sec.	Grams.	
1	5,000	0 58	15.7 (?)	
2	5,000	0 59	9.6	37*
3	5,000	0 58	8.9	
4	5,000	0 55	8.3	
5	5,000	0 57	7.7	
6	5,000	0 54	7.0	
7	5,000	0 55	6.6	
8	5,000	0 56	5.3	25
9	Bottle Empty			
10				

* The maximum and minimum percentages are alone noted.

EXPERIMENT IV.

Air under exactly similar conditions was drawn through the chloroform bottle, filled to its working level and standing in water.

No.	Air.	Time.		Amount of CHCl ₃ Evaporated.	Per Cent.
		Min.	Sec.		
1	C.cm. 5,000	6	16	Grams. 4.1	13.4*
2	5,000	6	8	3.9	
3	5,000	6	16	3.8	
4	5,000	6	6	3.9	
5	5,000	5	59	4.0	
6	5,000	6	9	3.7	
7	5,000	6	22	3.9	
8	5,000	6	2	3.8	
9	5,000	5	42	3.9	
10	5,000	5	44	3.9	13.6

*The maximum and minimum percentages are alone noted.

On blowing air through the chloroform the following figures were obtained. As a contrast, the bottle in this case was not placed in water. Room temperature, 18° C.

No.	Air.	Time.		Amount of CHCl ₃ Evaporated.	Percentage of CHCl ₃ in Air.
		Min.	Sec.		
1	C.cm. 5,200	2	1	Grams. 4.95	15.7*
2	5,200	2	5	4.75	
3	5,200	2	1	4.2	
4	5,200	1	55	4.15	
5	5,200	1	50	4.15	
6	5,200	1	50	4.05	
7	5,200	2	5	3.87	
8	5,200	1	45	3.87	
9	5,200	1	40	3.9	
10	5,200	1	30	3.5	12.7

*The maximum and minimum percentages are alone noted.

EXPERIMENT V.

This consisted of setting up the apparatus in its basin of water and blowing air through both bottles at the same time. The amount of each anaesthetic evaporated was weighed.

No.	Air.	Time.		Amount of CHCl ₃ Evaporated.	Amount of Ether Evaporated.
		Min.	Sec.		
1	C cm. 5,000	1	18	Grams. 1.6	Grams. 6.6
2	5,000	1	17	1.4	5.6
3	5,000	1	14	1.4	5.5
4	5,000	1	11	1.4	5.0
5	5,000	1	10	1.7	5.2
6	5,000	1	10	1.6	4.9
7	5,000	1	9	1.6	4.8
8	5,000	1	9	1.4	4.6
9	5,000	1	9	1.4	4.5
10	5,000	1	8	1.4	4.4

In this last observation the percentage composition of the issuing air varied from

5.3 per cent. CHCl₃ and 29 per cent. (C₂H₅)₂O
to 5.1 per cent. CHCl₃ and 21 per cent. (C₂H₅)₂O.

From these experiments I conclude:

1. That in practice the amount of anaesthetic in the air delivered to the patient increased with the rate of pumping.
2. That when the chloroform bottle stands in water the percentage in the issuing air is fairly uniform.
3. That the amount of ether in the air is not so constant, varying far more than the chloroform. As the air stream traverses a long or short column of the ether, so the percentage in the issuing air is more or less.

INDUCTION OF ANAESTHESIA.

The methods available are:

1. Chloroform.
2. Chloroform and ether ("two-bottle" method).
3. Gas and ether.
4. Ethyl chloride and ether.

I think chloroform alone should never be used for inducing anaesthesia if it can be avoided. The "two-bottle" method is always available, and I have never met a case in which it could not be used. When ethyl chloride and ether is contraindicated it will be found an excellent means of inducing anaesthesia, and, provided the induction is not hurried, is practically free from risk.

I have given up gas and ether as it is not always easy to prevent cyanosis, with salivation and secretion of mucus, which are to be specially avoided when adrenalin is used as a haemostatic.

Ethyl chloride and ether is used whenever possible; it produces less secretion and practically no cyanosis as compared to gas and ether. The objections raised, that it is more unpleasant for the patient, have no foundation, if carefully given.

To the Clover I use is attached a Hewitt's gas valve and a large bag. The inhaler is filled and the valves arranged so that the patient breathes "to and from" the air through the valve nearest the bag. A cubic centimetre of ethyl chloride* is introduced into the bag, the inhaler is now applied, and the valve nearest the bag gradually closed, so that the patient has slowly presented to him the dilute ethyl chloride vapour. As soon as the valve is closed the body of the inhaler is very gradually rotated in the usual way. In this manner the patient is anaesthetized without any unpleasant sensations of choking. Swallowing and holding the breath are avoided. Directly the patient is under, the air valve nearest the bag is opened about $\frac{1}{2}$ in. and is kept so, thus allowing an admixture of fresh air with the ether vapour.

Given in this way, it takes from one to two minutes longer to get the patients under, but the distressing sensations complained of in the ordinary method are absent, and secretion of mucus the exception.

CHANGING TO THE OPEN METHOD.

As soon as the patient is under, the gag is introduced and pumping started.

In cases induced with ethyl chloride and ether, the ether taps alone are opened, pumping is started at first slowly, then more quickly, and in a very short time the patient can be got deeply under ether.

Anaesthesia is maintained by varying the rate of pumping, so as to regulate the depth of anaesthesia to the requirements of the moment.

Should the patient tend to come round when the ether is first administered from the apparatus, the admixture of a small quantity of chloroform vapour from bottle No 2 is all that is necessary; as anaesthesia deepens the chloroform is gradually lessened until only pure ether is being given.

If, on the other hand, anaesthesia is commenced with chloroform and ether, start with the mixed vapours, from the apparatus, and gradually lessen the chloroform, watching all the time for any sign of secretion. In a large percentage of cases open ether can be given with impunity, but if it is seen that the patient will not take the open ether, then try until the largest percentage of ether and the smallest of chloroform the patient will take is found. I have not met a case in which some ether could not be given with the chloroform. If it is evident from the first that pure ether is inadmissible, start with the mixture and then arrange it as above.

In starting always be most careful to have a weak vapour, the strength of which is gradually increased by regulation of the taps, with more forcible and frequent pumping.

When changing from a mixture of chloroform and ether to ether or chloroform alone, the stream of air passing through the anaesthetic must be lessened, for, if this is not done, shutting off the one anaesthetic will increase the amount of the other, as the air stream, having a lessened channel to pass through, must do so more quickly, and, as we have seen above, the amount of anaesthetic delivered

* I am indebted to my colleague, Mr. A. L. Flemming, for bringing to my notice the efficiency of such small doses of ethyl chloride.

to the patient will under these conditions be greater than it was in the mixture.

Under no circumstances change from ether to chloroform unless the corneal reflex is present. The points to aim at during the administration are—a light anaesthesia with avoidance of secretion.

In cases where cocaine has been used a very brisk corneal reflex can be maintained all the time, unless the operator should go beyond the insensitive area. If no cocaine has been used, it is necessary to keep the patient more deeply under, but the corneal reflex need not be abolished. I never work with the corneal reflex gone if I can possibly help it.

It is not necessary to keep the patient at one uniform level of anaesthesia. Always try and suit the depth to the manipulations of the moment, and in this way I believe the patient is spared a lot of the unpleasant after-effects of the operation.

Secretion is one of the most difficult problems to be dealt with in these cases, especially if adrenalin has been used, because the surgeon so often requires the patient's head placed in the mid-line, so that it is impossible for the secretion to gravitate into the cheek and so out of the mouth. Instead it tends to fall back into the pharynx and larynx.

However, minute care in the induction and maintenance of anaesthesia on the lines suggested will in the majority of cases free us from this trouble. Much secretion means (1) cough, (2) intercurrent asphyxia, (3) chronic oxygen starvation.

THE TYPE OF ANAESTHESIA.

Patients anaesthetized with the mixed vapour present the same features as do those anaesthetized with a mixture of the two drugs, given on a mask in the usual way. In those anaesthetized with ether vapour alone the face is slightly flushed; the pupils, usually somewhat contracted, vary with the depth of anaesthesia; respiration is regular, soft snoring and moderately deep; the pulse full, regular, and slightly quickened. The colour remains good, even when deeply under. In the majority of cases there is little if any secretion and very little sweating.

HAEMORRHAGE.

The control of haemorrhage naturally falling under the care of the surgeon, the anaesthetist is simply concerned with the method of preventing access of blood to the larynx.

When the source of bleeding is outside the mouth or nasal cavities, it does not directly affect the administrator, but bleeding from within the mouth and nose, as in nasal operations, does directly affect him, and he should be prepared, in conjunction with the operator, to take such steps as will prevent its reaching the air passages.

When the source of bleeding is within the mouth sponging only can be resorted to, and it is usually arranged by the surgeon whether the assistant or the anaesthetist shall undertake the duty.

In antral operations where bleeding comes from between the cheek and gum, a long roll of wool packed between the teeth, from the mid-line in front to the ramus of the jaw behind, makes a watertight joint, and at the same time I am in the habit, unless the surgeon object, of having the naso-pharynx plugged.

During operations within the nose or on the frontal sinuses, blood can be prevented from escaping through the posterior nares—either by plugging them or the naso-pharynx.

The posterior nares are plugged by gauze passed through from the front; the naso-pharynx by a sponge passed up behind the soft palate, preferably with Watson Williams post-nasal plug forceps.

The arguments in favour of plugging the posterior nares are:

1. Less bleeding.
2. No risk from the pharyngeal reflex.
3. The airway is not obstructed by bulging forward of the soft palate.
4. There is less risk of secretion of mucus from irritation of the pharynx.

But in favour of the naso-pharyngeal plug, which I strongly advocate, it may be said:

1. It does not increase the bleeding.

2. I have never seen it produce reflexly any ill effect.

3. The airway is easily kept patent by drawing forward the tongue.

4. Properly introduced and kept in its right place, it gives rise to little if any secretion.

Further, it can be easily, almost instantaneously, applied after very little practice. The posterior nares are plugged with difficulty, the gauze tending to find its way into the naso-pharynx, a watertight joint being very difficult to obtain, whilst if any operation has to be done on the sphenoidal sinus or posterior ethmoidal cells, the gauze will be in the way.

To introduce the post-nasal plug, which is best made of marine sponge, fix it firmly in the forceps (Fig. 2), pass it to the back of the mouth, as if its destination was the larynx. When on the posterior pharyngeal wall, below the soft palate, rotate it upwards through half a circle, when it easily slips into place, and, finally, depressing the handles, push the sponge home. The forceps are left on. Dr. Williams uses a special form of retractor to pull the soft palate forward and thus facilitate the introduction, but this is not absolutely necessary. The right size of sponge is soon learnt by practice; it should be introduced without fumbling or mucous secretion may be set up; the patient must be sufficiently under to prevent difficulty from contraction of the muscles of the palate and fauces.

On examining the soft palate, after introducing the plug, two things will be noticed—small beads of mucus standing out on the buccal surface, and a bulging forward and downward of the soft palate itself. If deftly introduced and the forceps steadied by the anaesthetist, no further secretion takes place. Should free respiration be interfered with by the bulging palate meeting the dorsum of the tongue, the small tongue hook (Fig. 2) hooked into the tip of the tongue in the mid-line will draw it forwards and clear the airway.

On the tongue hook will be noted a small ring; this can be slipped over one of the hooks on the plug forceps, thus mechanically holding the tongue forward and obviating the necessity of using the hand. There is no necessity to forcibly drag the tongue out, just sufficient tension to clear the palate being all that is required.

This may seem complicated, but the plug can be introduced and the hook fixed in a few seconds, giving a free airway, an absence of all anxiety relative to blood entering the larynx, and the advantage of being able to place the head in the mid-line without the tongue falling back. I have only heard of two patients who complained of this tongue hook—one in private and one in hospital practice. Patients when questioned next day always say they have no discomfort.

The effect of the anaesthetic on haemorrhage when care is used is not so great as some would have us suppose. Chloroform, chloroform and ether, and ether, in the order given, cause increasing amount of haemorrhage, but the amount caused by ether given with care is, in my experience, so little in excess of that produced by chloroform, that it is usually impossible to say from the amount of haemorrhage which anaesthetic is being used.

If a patient is kept cyanosed, whether from injudicious ether or obstructed airway, he will bleed, and under these circumstances it is hardly fair to blame the anaesthetic.

It occasionally happens that patients whose nasal passages have been plugged previous to operation give some trouble whilst going under with ethyl chloride and ether. Breathing takes place through the mouth until consciousness is lost, when an attempt is immediately made to breathe through the plugged nose, and it will sometimes take a lot of "dodging" to get a return to oral breathing. The best way is to use a large facepiece and to insert a small mouth-prop, when very little trouble will be experienced. The difficulty with these cases is that they refuse to breathe except through their plugged nostrils.

When anaesthesia is induced by chloroform and ether, patients with their noses plugged take longer to go under, but the same difficulty is not experienced with their breathing.

At the conclusion of an operation where the post-nasal plug has been used, after the patient is cleansed, the head should be turned on one side and the opposite shoulder raised; the tongue hook is removed but the gag left in. In this position the patient remains until it is judged that

he is sufficiently round to obviate all danger of blood entering the larynx. The post-nasal plug is now taken out; some blood is sure to be retained above it, and this, when it finds its way into the pharynx, can be sponged out. The gag should next be removed. The reason for leaving it in so long is to render the swallowing of blood more difficult, a thing to be avoided as likely to cause vomiting.

The patient is taken back to bed on his side, and kept in that position under efficient observation until round.

It perhaps hardly comes within the scope of the anaesthetist to apply haemostatic measures, although, in common with the operator, he may suffer from the want of them; but in intranasal operations by far the best results I have seen have been obtained by packing the nose just before the operation with separate small pieces of gauze, wrung out of a solution of 10 per cent. solution of cocaine with adrenalin (1 in 5,000), the strips being applied to the spot to be operated on by aid of speculum and forceps.

MANAGEMENT OF THE SECRETION OF MUCUS AND SALIVA.

In cases anaesthetized for nasal operations, in the manner described above, trouble occasionally arises from secretion of mucus and saliva. This is practically always due to the adrenalin used, and constitutes the chief difficulty with which we have to deal; many of the cases do not secrete at all, and the rest if properly managed will give no trouble. But occasionally a case is found where the secretion is a nuisance, preventing a smooth anaesthesia and taxing the skill of the anaesthetist to the utmost. It is often necessary to keep the head raised and in the middle line: this greatly adds to the trouble, as the usual course of lowering the head and turning it on one side cannot be resorted to.

Secretion interferes with free respiration and so causes cyanosis, which begets more secretion; thus if great care is not taken a vicious circle is started, soon leading to a most undesirable state of things. Fortunately it is nearly always avoidable, and when it does occur is fairly easily managed.

Secretion is caused by (1) adrenalin used as a haemostatic, (2) the anaesthetic, (3) mechanical irritation by plugs and injudicious swabbing of the fauces, (4) cyanosis.

Adrenalin.

One action of this substance is to cause a secretion of thick mucus and saliva.

Now, this result has been said to occur only after adrenalin has been injected. But I have seen it after its application to the mucous membrane, and especially after it had been used to stop bleeding, when there was much raw surface, especially so if the solution was a strong one. From a few experiments I have tried on myself, I concluded that ether increased the secretion when a strong solution of adrenalin was used; but with a weak solution I could get no definite proof of this action.

The Anaesthetic.

Of the two anaesthetics, ether is the most troublesome in this respect; a strong ether vapour, as is well known, tends to cause both salivation and secretion. The importance of a careful induction has already been insisted on. When open ether vapour is first administered, it will be found that by gradually increasing the strength until tolerance is fully established, very little if any secretion will result, and this soon stops. An attempt to save time by getting the patient under quickly is much to be deprecated, as it is a very usual cause of this trouble.

Mechanical Irritation.

If the post-nasal forceps are not kept still, secretion will be set up. If steadied by one finger this trouble can be avoided.

Rough and unnecessary sponging-out of the pharynx is another and fruitful source of mucous secretion. It should be done as seldom and gently as possible.

Cyanosis.

As one of the first and constant cares of the anaesthetist is to keep a free airway, cyanosis should not occur. But if it does—and for some reason the cause cannot be entirely

removed—give a very small quantity of oxygen with the anaesthetic, just sufficient to keep the patient a good colour. On the few occasions I have had to use it the result was excellent.

There is one point in connexion with this question of secretion to which I wish to draw particular attention. In those cases where I have had trouble adrenalin has always been used. In a series of cases where I used this method of anaesthetizing patients for operations, both on the nose and on other regions, where adrenalin was not used, I had no difficulty from the secretion. These control cases show that the extreme amount of secretion occasionally met with is not due to the ether.

COCAINE AND ADRENALIN.²

When anaesthetizing patients for operation who have just previously been treated with one or both of these drugs, the following considerations should be borne in mind.

Under certain conditions both are poisons. The peculiar idiosyncrasy to cocaine shown by some people is well known; nevertheless I have only once seen symptoms arising from this cause. In this case the larynx was painted with 20 per cent. cocaine for bronchoscopy. Towards the end of the examination the patient showed symptoms only attributable to the cocaine. These gradually passed off. Anaesthesia was induced with chloroform and ether and maintained by a little ether. But although this is the only case I have had personal experience of during anaesthesia, I have several times seen patients exhibiting toxic symptoms after their mucous membranes had been painted with cocaine; therefore the possibility of such symptoms occurring should not be forgotten.

With adrenalin I have several times seen a group of symptoms appear which could only be attributed to its action. They have been specially marked after it had been applied to a raw surface to stop bleeding. Twice they have appeared after the nose had been packed with strong adrenalin without any breach of the mucous surface. These symptoms, which I have only seen when adrenalin was used, are a rapid pulse—from 120 to 200 per minute—a peculiar "floppy" heart action, profuse sweating, and secretion from the pharyngeal and tracheal mucous membrane. What the blood pressure is I am unable to state, never having measured it under these circumstances. I have never found glycosuria in any of the cases treated with adrenalin.

SURGICAL SHOCK.

Except in some cases of submucous resection of the nasal septum, surgical shock is not met with.

Here symptoms of both respiratory depression and cardiac shock have shown themselves—namely, shallow, irregular breathing, and a slow, weak pulse, always during that part of the operation dealing with the cartilaginous septum. Directly the septum is removed, and the bony crest is being dealt with, these symptoms pass off. Once or twice, when giving chloroform to these cases, they have caused me some anxiety. The explanation is that during the manipulation of the cartilage the naso-palatine branches of the fifth cranial nerves are stimulated, and through the connexion of the reception nucleus of the fifth nerve with the vagal nucleus inhibiting impulses reach the heart. It is well known that excitation of afferent fibres of the respiratory tract will produce cardiac inhibition, arrest of respiration, vaso-dilatation, and fall of blood pressure.³ The afferent paths, that is to say, the naso-palatine nerves, being divided with the cartilage, the stimuli cannot pass. Therefore, when the cartilage is removed the symptoms disappear.

I now give all cases of submucous resection submitted to general anaesthesia, ether, and since doing so I have only seen these symptoms in a very much slighter form, never sufficiently marked to give rise to the slightest anxiety.

AFTER-EFFECTS.

These have been slight. There has been no case of pneumonia, and only one of very mild bronchitis due to blood accidentally entering the bronchi. There have been no other respiratory complications.

Vomiting: as in a large measure the comfort of the patient depends upon the amount of vomiting, I have followed my after-results closely. At first sight they do not appear good, but it must be remembered that most of these patients swallow some blood, and in my experience this is practically always vomited. Then, as the majority of the vomiting takes place before complete consciousness is established, the patient knows little or nothing about it. In only one case was treatment for the vomiting required—in that of a woman who vomited for twenty-four hours (after an operation on the sphenoidal sinus).

If the number of times that the patient vomits may be taken as a rough index of his feelings after an anaesthetic, the following table will be of interest. It must be remembered, however, that he may vomit once or twice before fully round. All the patients were prepared after the manner advocated by Mr. A. L. Flemming,⁴ and the vomited matter has consisted practically of blood or altered blood.

Of the cases on whom these observations were made—

Vomited.	Did not vomit.
77 per cent.	23 per cent.

Of the patients who vomited—

30 per cent. vomited	...	Once.
27.5 per cent. vomited	...	Twice.
25 per cent. vomited	...	Three times.
5 per cent. vomited	...	Four times.
2.5 per cent. vomited	...	Five times.
5 per cent. vomited	...	Six times.
*5 per cent.	; vomiting lasted over twelve hours.	

*One case vomited for twenty-four hours, and required special treatment.

CONCLUSIONS.

From the foregoing remarks it will be seen that patients anaesthetized by this method are easily given open ether for operations on the throat and nose. The chief difficulty met with is excessive secretion, which I have never seen unless adrenalin had been used. This excessive secretion has only followed the use of strong and never the use of weak (1 in 5,000 and under) adrenalin.

The method of using the post-nasal plug has been described at length; having once tried it on a suitable case, no one, I am sure, would ever be without it.

Another point I wish to emphasize is the reflex effects occasionally met with in submucous resections. From my experience I very strongly advocate ether for these cases when a general anaesthetic is used.

The accompanying chart of the blood pressure from such a case is, I think, worthy of study, and I am indebted to Dr. Watson Williams, under whose care the patient was, for permission to make the observations. (Fig. 4.)

Fig. 4.—Blood pressure. Submucous resection. A, Start separating mucous membrane. B, Separating mucous membrane opposite side. C, Cartilage divided. D, Anaesthetic stopped. E, Vomiting. F, Patient conscious.

It must not be thought that on account of the prominence given to the difficulties found in anaesthetizing these cases that they are of frequent occurrence; on the contrary, they are the exception. It has been done with the view of suggesting how to manage them when they do occur.

I have to thank Professor Francis Francis and Mr. O. C. M. Davis (Bristol University) for much help in the estimation of the chloroform and ether percentages. These represent the maximum output of the machine under average working conditions. I wish particularly to draw attention to the strength of the chloroform vapour. The greatest care should be taken when using chloroform alone, but when the mixture is used, the strength of the chloroform vapour presented to the patient is diluted by the inspired air to a sufficient extent—not that this factor should make us any less careful.

With regard to the ether percentages, I am unaware what percentage strength of ether vapour is required to produce anaesthesia, but I do know that the percentage produced by the apparatus is more than is required. It is surprising what a weak ether vapour, continuously given, is required to keep a patient under. Much is harmful, giving rise to the unpleasant symptoms associated with the drug.

[I am indebted to Messrs. Down Bros. for much help in the actual manufacture of the apparatus.]

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STATE INSURANCE AND THE POOR LAW COMMISSION.

By J. H. KEAY, M.D.,
GREENWICH.

THE Poor Law Commissioners have differed widely in opinion as to the best means of dealing with pauperism and poverty. In one thing, however, they are agreed. They have given it as their unanimous verdict that not a little of the poverty and pauperism in this country is due to the fact that there is no provision for adequate medical attendance. Nor can we deny it. The remedies put forward in the Majority and Minority Reports are generally regarded by medical men as unsatisfactory. The question now is: Are we ourselves prepared to bring forward a remedy? There can be no doubt that, though somewhat late in the day, there is now a decided movement in that direction. A scheme of medical attendance has been discussed at the Representative Meeting, and will be sent down to the

Divisions, when every member will be free, and it is to be hoped prepared, to give his opinion. Of course, we are aware that the British Medical Association does not embrace the whole medical profession. Objections have been made to its constitution and management; the Association is on a democratic basis, and these are open to remedy; and of this, at least, we may rest assured, that if any scheme of medical attendance is to be brought forward, it can only be under the auspices of the British Medical Association. There is no other body at present in existence that represents the interests of all and is numerically strong enough to deal with it.

In endeavouring to contribute towards the solution of this question I make no secret of the fact that some years ago, after long pondering the subject, I came to the conclusion that the best remedy is State insurance; nor have I since discovered any reason why I should depart from that conclusion. State insurance has been in force in Germany for more than a quarter of a century. We can now study it in all its details. We can see in what