The eye having been exposed by means of a self-acting wire speculum, a fine needle, with a stop to it, so as to prevent its passing too far, is introduced in the usual way, and is passed into the centre of the capsule; another needle is then introduced from the opposite point, and entered into the capsule as nearly as possible at the same spot as the other; the points of the two needles are then made to separate from each other, and the capsule is thus effectually torn through.

This operation occurs, requiring but a few modifications of this plan. Thus, the capsule is sometimes so tough, and at the same time so floating, that the point of the needle introduced through the cornea will not penetrate it. When this is the case, the two needles must be introduced, through the sclerotic, and pushed through the capsule from behind. This double action of the needles—one from before, and the other from behind—can be made to penetrate any capsule, however tough and movable, and it is thus readily torn open. Sometimes a bar of capsule runs across the pupil, and it is very difficult to divide. It may be accomplished by introducing the needles at right angles to it, passing the blade of one in front of the other, and the other behind it, and then, by pressing them together, cut it through; or, if this is found impossible, by revolving one needle round the other, the band is gradually wound around one until it breaks through. It requires some little practice to maneuvre two needles with dexterity and efficiency; but when the requisite amount of facility is acquired, it is very seldom a case occurs for which it is not available.

Taking into consideration the frequency of these cases, and the insuperable difficulties that formerly existed in their management, I do not hesitate to pronounce this suggestion, simple as it may seem, as the greatest modern operative improvement in ophthalmic surgery. It occasionally happens that a piece of tough capsule becomes entirely detached, and falls loose in the anterior chamber. When this is the case, it must be extracted. Very rare cases also occur, in which the capsule is attached on one side, and leaves the other side free; in this way, the two needles must be brought together, or the capsule torn open. Under these circumstances, a small opening must be made in the cornea, and by means of a pair of canular forceps it must be seized and drawn out, great care being necessary, not to drag away the iris or the ciliary processes, and, as I understand, to damage the chorion.

In my next lecture, I propose to describe the operation of extraction.

ON THE EMPLOYMENT OF CHLOROFORM IN SURGICAL OPERATIONS.

By JOHN SNOW, M.D.

(Concluded from p. 383.)

It is unnecessary to say anything on the propriety and advantage of administering chloroform in lithotomy, in the larger amputations, and the removal of tumours of the breast, for I believe the whole of the profession agree on this point. There is still, however, some difference of opinion as to the propriety of giving it in lithotomy. It has been said that the surgeon requires the assistance of the patient's sensations, to prevent him from seizing the coats of the bladder in the lithotrite; but if this were the case, I believe that the operation could never have been performed at all. Some patients are extremely sensitive when anaesthetized, and a slight touch would be the proper guide to prevent mischief. The greatest sensibility of the bladder appears to be at the neck, and great care must be taken not to seize the membrane of the cavity would cause much pain. It has always appeared to me that the operation of lithotomy is one in which chloroform prevents very great suffering, and is of the utmost cases now and then the patient, quite against my opinion of one who had much practice in lithotomy both before the introduction of anaesthetic surgery and since, and is therefore better able to judge. Mr. Ferguson says, in his "Practical Surgery," that I am of opinion that it cannot be insisted on in connection surgery in which anaesthesia has been of more service than in this. Since the earliest period of its introduction I have almost invariably used it on such occasions, and with the best possible effects; and now I no more think of performing the operation of lithotomy without this agent than I would that of lithotomy. Many other surgeons are of the same opinion as Mr. Ferguson, and some of those who are disinclined to use it as a general rule, practically admit its benefits by resorting to its employment in cases of very severe pain, such as those in the urinary passages, or in the case of a very marked iritis, or the patient very intolerant of pain. The operation of lithotomy requires a pretty full dose of chloroform, as, without this, the patient is apt to strain very much and move his legs about. Sometimes I have given a full dose.

Some surgeons, and more especially those of Edinburgh, had an objection, at one time, to employ chloroform in large operations about the mouth and nose, and especially in the removal of tumours of the jaw, because the breathing would be embarrassed during the state of insensibility and cause suffocation. However, I have given chloroform in a great number of such cases without any ill effects. Unless the effects of the chloroform are too deep or long-continued, the sensibility of the glottis is not impaired; if a little blood enters the windpipe, it is coughed out again; the patient can hold a little blood in his throat, and breathe through it with a gurgling noise, just as he would in the waking state; and if the quantity of blood begins to embarrass the breathing, the head must be leaned forward to get rid of it, and the same attention paid to the patient which would be paid if chloroform were not used. After the commencement of an operation of this kind, a little chloroform may be given from time to time, on a sponge, as opportunity permits, so as to keep up the insensibility to some extent. I prefer, under these circumstances, to have the chloroform diluted with water, and given in the manner and for the reason that I have mentioned further on, in treating of its use on a handkerchief.

A case has been related by Mr. Prescott Hewett, in the Medico-Chirurgical "Transactions," (vol. xxxiv., p. 43,) in which a patient died as soon as he had breathed any chloroform. In which the patient had been vomiting; and although a little vomiting has taken place after the operation, and for some time afterwards, was simply those of syncope, and not of embarrassed breathing; and, again, the amount of blood met with in the lungs was not enough to cause death, or even acute symptoms of any kind.

Extraction of cataract is an operation in which surgeons hesitated for a long time before employing chloroform. They were afraid lest the very odour of chloroform should follow the use of this agent might be injurious to the eye. Mr. George Pollock and Mr. White Cooper were, I believe, the first surgeons who adopted the use of chloroform in the extraction of cataract; and I have been informed that this has also been in many operations of this kind for Mr. Lawrence, Mr. Bowman, Mr. Haynes Walton, and others. Several of the patients were considerably over eighty years of age. By taking care not to give the chloroform too soon after a meal, there has very seldom been vomiting; and although a little vomiting has taken place in a very few of the cases, it was not attended by straining, and the patient, understood, did not have. If a patient case have indeed, been informed me, of which I was not present where chloroform was given, and where the patient vomited and expelled the humours of the eye; but she was a person of great delicacy, and died of an emphysematous condition; in which case the operation was performed with chloroform, and the patient died two hours after the use of chloroform. In some cases, where the patient is very nervous, and the eye very irritable, I believe that chloroform is essential to the success of the operation, but it is not necessary to use it in all cases. I understand from Mr. Bowman that his practice is to operate without chloroform in cases where the patient does not wish for it, and has resolution to lie still, and keep the eye steady. The operation is said to be very painful, but which has it not necessary to rouse the patient, if he is not very insensible; it is necessary therefore to induce complete insensibility, and to keep it up till the lens is extracted, as the least movement of the patient may be prejudicial.

Operations about the anus generally require a full dose of chloroform, as the part is very sensitive when in a state of disease, and the patient, if not quite insensible, has a tendency to move his legs, which is very embarrassing to the surgeon,
especially if there is no one to hold them. It was feared at one time that there would be a difficulty in operating for haemorrhoids under chloroform, as the patient is often required to press them down; but it is found that if he do so, before he is beginning to inhale, the bowel remains down; in fact, there is a great "tendency to make a straining effort." This is more especially the case if there is no one to hold them. It was feared at one time that the patient would bleed more during operations under chloroform than under ether, and this is equally true of the deaths which have since occurred.

February, 1849, half an ounce of chloroform was used without ill effect. The fact is that the death of the patient in an operation, and this is equally true of the deaths which have since occurred. This is a more melancholy conclusion than the former, as it invests the chloroform with some peculiarity of constitution at one time which he did not possess at another, especially within the space of two hours.

In two papers which I had the honour to read to the Medical Society of London* a few years ago, it was shown that the danger from chloroform, when it is used in a very diluted form, a large quantity of it may be drawn into the lungs all at once, at a time when the pulmonary circulation is probably much retarded from the temporary suspension of respiration. In this way the heart may be so overcharged with chloroform as suddenly to paralyse the heart. In a considerable number of the fatal cases of inhalation of chloroform, the patient expired suddenly whilst he was struggling in an involuntary manner.

The danger which exists in giving chloroform is simply this: that the patient should be allowed to breathe air too highly charged with the vapour of chloroform. When the vapour of chloroform has dissolved one part of chloroform, and this explains not only how accidents may be carried the effects of the chloroform too far. If it begins to dissolve, or one part of chloroform to about 5,184 parts of air, the patient will dissolve, or one part of chloroform to about 5,184 parts of air, the patient. According to experiments, which I related on a former occasion. I cannot with a handkerchief regulate the amount of vapour and of air in the manner that is desirable; but I consider that those who are to give chloroform on a handkerchief must do so without danger, though with no great accuracy, if they dilute the chloroform with rectified spirit. Either two parts by measure of spirit to one of chloroform, as recommended by Dr. Warren, of Boston, in American, or equal parts of each, answer very well. Very little of the spirit is inhaled; it remains behind on the handkerchief, but it has the effect of lowering the elastic force of the lung, and thereby diminishes the intensity of the electric force, and makes it more likely to be compressed or to tear, when the air passes through it, than when the air is free to pass through the substance as to take seven or eight minutes. In giving chloroform, it is best to observe every symptom exhibited by the patient; but this is a peculiarity of constitution at one time which he did not possess at another, especially within the space of two hours.

In whatever way chloroform is given, it is necessary to begin gently at first, in order to acustom the mucous membrane of the air-passages to the pungency of the vapour, and to increase the strength of the vapour by degrees. I usually take two or three minutes in children and about four minutes in the adult when the patient is insensible under chloroform. In cases where the patient struggles much, it is sometimes desirable to proceed so cautiously as to take seven or eight minutes. In giving chloroform, it is best to observe every symptom exhibited by the patient; but this is a peculiarity of constitution at one time which he did not possess at another, especially within the space of two hours.
be stertorous, it is advisable to suspend the inhalation. The pulse is of less consequence than many of the other signs; for if the chloroform be permitted to mix with air, it cannot seriously affect the pulse, and if it be not the pulse might cease suddenly. Its last beat in some of the accidents which have happened has been equal in strength to any which went before.

It is impossible in a brief space to allude to more than a few of the points connected with the use of chloroform in operations. I have therefore passed over most of those points on which I believe the profession are entirely agreed, and have treated chiefly on those respecting which I considered that my views might differ from those of, at all events, some of my professional brethren, in order that there might be the more room for the expression of opinion and experience.

On the Artificial Membrana Tympani.

By Joseph Toynbee, F.R.S., F.R.C.S.

Artificial Membrana Tympani.

The use of an artificial membrana tympani is a subject, I trust, of sufficient importance to render it unnecessary for me to excuse my making some observations respecting it, in reply to certain remarks recently published in The Lancet.

In the year 1848, Mr. Yearsley published a pamphlet entitled "A New Mode of Treating Deafness when attended by partial or entire Loss of the Membrana Tympani, associated or not with Discharge from the Ear," this pamphlet being a reprint of some letters which appeared in The Lancet when opened momentarily for the egress of mucus and the ingress of air.

2. That the faucial orifice of the Eustachian tube remains closed except during the act of deglutition or a forcible expiration.

3. That the tympanum is naturally a closed cavity, except when open momentarily for the egress of mucus and the ingress of air.

4. That the sonorous undulations are not conveyed to the labyrinth through the chain of ossicles, but through the air of the tympanic cavity, to the membrane of the fenestra rotunda.

The closure of the Eustachian tube, except during the act of deglutition, can be experimentally proved without difficulty. The patient is accustomed to descend in the diving bell, it is known that the unpleasant sensation of pressure in the ears, amounting sometimes to positive pain, is capable of instantaneous removal, by the act of swallowing, during which the lumina and tensor operations open for a moment, the air of the Eustachian tube, and the condensed air being allowed to enter the tympanum and come in contact with the inside of the membrana tympani, the pressure on the outer surface of the latter is counterbalanced. Again, if an attempt be made to swallow while the nostrils are closed by the finger and thumb, a sensation of fullness and pressure will be experienced in the tympanic cavity, in consequence of air having been forced, during the act of deglutition, through the open tube into the Eustachian protuberance; and then, during another act of swallowing, the tube is re-opened, and the confined air escapes into the fauces. In one of the papers above alluded to, an account was given of the muscles which open the Eustachian tube in mammals, and in which the guttural orifice is examined, the guttural orifice remained closed except during the muscular action.

Having, by a series of experiments, arrived at the conclusion that the sonorous vibrations are transmitted to the labyrinth through the air in the tympanic cavity, and that it is requisite for these vibrations to be confined to the tympanum, so that, by means of the membrana tympani and the ossicular walls of the tympanum, they may be conveyed with sufficient force upon the membrane of the fenestra rotunda, it appeared to me a natural consequence, that an orifice in the membrana tympani, by allowing the undulations to escape into the tympanic cavity, to diminish the power of hearing, and, if there co-existed besides, a thickening of the tympanic mucous membrane, considerable deafness might be the result. It also seemed probable, that as the sonorous undulations were not conveyed to the labyrinth by the ossicles, that where the entire membrane was absent, an artificial membrana tympani might be supplied, which, by rendering the tympanum once more a closed cavity, would cause the undulations to pass onward to the labyrinth, and thus restore the power of hearing. The difficulty in the way of making an artificial membrana tympani, which had arisen from a supposed necessity of attaching it in some way to the tympanic wall, and which was frequently supposed to have been vanished.

My hopes of success in the construction and use of an artificial membrana tympani were further strengthened by some experiments performed upon cases of perforate membrana tympani.

* Anatomy and Physiology of the Organ of Hearing, pp. 105, 106. 1833.

† Philosophical Transactions, Vol. J., 1851; and Proceedings.