The type of prostatitis encountered is described in detail, and its aetiology is discussed. No theory of its causation is advanced. Further careful and more comprehensive investigations, with the use of controls, will have to be undertaken before the problem is finally solved and a more efficient and rapid form of treatment of the condition is evolved.

I am indebted to Dr. R. M. Dowdeswell for his kind help and voluntary co-operation in what promised to be a very interesting series of investigations (I was posted outside the Command before they had progressed very far); and to Lieut. E. S. Machell, R.A.M.C., for helpful criticism and suggestions. I also wish to thank Brig. G. M. Denning, one-time D.M.S., East Africa Command, for permission to publish this article, which has been abridged from the original written at No. 87 (Nairobi) British Military Hospital in June, 1946.

THIOPENTONE-NITROUS-OXIDE-OXYGEN ANAESTHESIA WITH CURARE FOR HEAD AND NECK SURGERY

BY

J. G. BOURNE, M.A., M.B., D.A.

Honorary Anaesthetist to St. Thomas's Hospital

My purpose here is to describe a way of using thiopentone ("pentothal")-gas-oxygen anaesthesia to cover the whole field of surgery of the head and neck, including ear, nose, and throat, in adult patients. The method employs curare, the passing of endotracheal tubes, and the performance of artificial respiration in patients who may be apnoeic for many minutes. The article is therefore intended only for specialists in anaesthetics who are familiar with these techniques and not for the "occasional anaesthetist," who is recommended to continue to use the better-known methods with ether.

Many anaesthetists now agree in placing thiopentone-gas-oxygen, where their use is applicable, in merit above all other agents for speed of induction, ease and safety in maintaining anaesthesia, and freedom from unpleasant sequelae. Used together, they provide light general anaesthesia suitable for surgery of skin, fascia, muscle, bone, joint, and nerve—suitable, in fact, for all operations on the limbs and the body wall. They would also cover operations in the ear, nose, and throat, on the face, scalp, and neck, and on the skull and its contents, were it not for the difficulties of intubating, packing the pharynx, and deadening the cough reflex when they alone are used.

To overcome these difficulties the common practice has been to deepen the anaesthesia with ether until the jaw and larynx are relaxed for intubating and then to continue anaesthesia with ether at a level where the cough reflex is deadened, aided perhaps by spraying the larynx with cocaine. The objections to this are threefold: (1) It is time-consuming: 15 minutes or more are usually needed to provide conditions for easy atraumatic intubation through the mouth, and attempts to intubate earlier often result in greater delay. (2) An ether anaesthesia of this depth is nearly always followed by nausea and malaise of considerable duration. (3) Under certain conditions there is a risk of explosion.

It was to eliminate these disadvantages and to gain those of the thiopentone-gas-oxygen combination that the method to be described was evolved. In this method curare replaces ether as the relaxing agent. The profound relaxation which it provides is quick and certain. The larynx and trachea can be very thoroughly "cocainized" by spraying, so that the cough reflex remains deadened, and intubating and pharyngeal packing are easy. The time taken is

greatly reduced, the patient is spared the unpleasant after-effects of ether, and no inflammable agent is used.

Method

In outline the sequence is as follows: (a) Initial injection of thiopentone, injection of curare, injection of maintenance dose of thiopentone. (b) Insufflation of the lungs with oxygen, using the Boyle's machine and mask, for two to three minutes until the full curare effect has developed. (c) Laryngoscopy, "cocainization," intubation. (d) The machine is now connected to the tube and the gas-oxygen flow started. The larynx is packed and gas-oxygen anaesthesia continued with "assisted" respiration until spontaneous respiration has recovered to a normal depth.

Consider these points in detail. The initial dose of thiopentone varies according to the principles well understood by anaesthetists, but should be on the generous side. For a robust young adult it is 12 to 14 ml. of 5% solution. The dose of curare is 20 mg. of pure crystalline *d*-tubocurarine chloride made up in 1% solution and called "tubarine" (Burroughs Wellcome). This is given quickly in one injection immediately after the thiopentone, and as the solutions of thiopentone and curare are incompatible it is better injected through another needle into a different vein.

At first smaller doses of curare were used and found insufficient in some cases where intubating through the mouth was necessary. But if intubating through the nose is required for an operation of short duration—as, for example, dissection of the tonsils by a quick surgeon—the smaller dose of 15 mg. is preferable. Unlike thiopentone, it is difficult to predict the approximate dose of curare that is required for any individual. What is important is that it should be sufficient. With a relative overdose, artificial respiration is, by the very nature of the action of curare, extremely easy to perform. With too small a dose intubation is difficult and the merits of the method are largely lost.

The maintenance dose of thiopentone is for the purpose of providing continual basal narcosis throughout the operation. What remains in the 20-ml. syringe is usually enough. It may be given immediately after the curare or intermittently over the next few minutes according to the reaction of the patient to the initial dose. In robust young patients the whole dose is generally given at once. If the operation is a long one, further small doses of thiopentone may be added from time to time when necessary, the ankle veins being chosen as conveniently remote from the surgical field.

Insufflation of the lungs with oxygen is most simply done by holding the mask firmly on the face, turning on the oxygen bypass, and alternately squeezing the bag to inflate the lungs and lifting the mask a little to allow the expired gases to escape. This is continued for two or three minutes, when the full effect of the curare will have developed. At this stage apnoea is complete, or nearly so, but the concentration and quantity of oxygen in the lungs is high enough to provide full oxygenation of the blood, under the conditions, for many minutes.

During these minutes laryngoscopy, "cocainization," and intubation are performed with care, with ease, and without hurry. There is inevitably some accumulation of carbon dioxide. It is likely that this develops slowly, as not only is the metabolism of the patient depressed by the premedication (omnepon 1/6 gr.=11 mg.; scopolamine 1/150 gr.=0.45 mg.) and by the thiopentone but also muscle tone is abolished by the curare. In any case it is a common practice for the anaesthetist deliberately to raise the concentration of alveolar CO₂ in the early stages of an anaesthetic without apparent detriment to the patient.

"Cocainization" is performed by spraying the larynx, under direct vision, with the usual type of Rogers spray. The exposure is so good that there is no difficulty in directing a cloud of fine spray not only over the larynx but down the trachea. If the operation is a long one, 2% amethocaine is used liberally, but for a short operation, especially one in which blood may accumulate in the pharynx when it is finished, 10% cocaine solution is used, and sparingly.

Oral is preferred to nasal intubation whenever the surgical procedure allows, and the largest tube which will pass com-

fortably through the larynx is chosen. This is encased in a special armouring, described below. It prevents kinking, acts as a mouth-prop, and is firmly tethered by a tape tied round the neck. The wide-bore airway thus assured is desirable in all cases, and is essential to intracranial operations.

Directly the tube is in position it is connected to the machine and the flow of gas and of oxygen started. The flow-rate of gas is standard for all cases at 6 litres per minute. The flow-rate of oxygen is 2 litres per minute (giving a concentration of 25%) until spontaneous respiration has recovered to a normal depth, when it is reduced to 1½ litres per minute (giving a concentration of 20%). In the early stages it is seen from the movements of the bag on the machine that spontaneous respiration is inadequate. This is easily dealt with. The pressure on the expiratory valve is increased until, when the bag is compressed manually, the chest is seen to expand. Rhythmical manual compression of the bag is continued thus so long as it is necessary to assist respiration. This is rarely more than 10 minutes, often less than 5; occasionally compression is not necessary at all.

That the above method of dealing with the respiratory weakness is effective is shown, first, by the complete absence of cyanosis in all patients, and, secondly, by the fact that if it is performed vigorously the CO₂ concentration can be so lowered that temporary apnoea results.

Apparatus

1. The ordinary Boyle's machine with standard Magill's attachment consisting of bag, tubing, expiratory valve, and face-mask.
2. Magill's endotracheal tubes, connexions, and catheter mount.
3. A flexible metal tube with bell-shaped mouthpiece (Fig. 1). This is made by Medical and Industrial Equipment, Ltd., in two

FIG. 1.—A flexible metal tube with bell-shaped mouthpiece, for use with Magill's tubes.

sizes: a No. 10, which is suitable for use with Magill's tubes of size 10, 9, and 8; and a No. 8 for Magill's tubes size 8, 7, and 6. This device effectively prevents the tubes from kinking even when they are softened by repeated boiling, which is the most satisfactory way to sterilize them. It encases the Magill's tube only as far as the base of the tongue, and has four holes near its mouth-end, through which tape is threaded and tied firmly round the neck (Fig. 2). It has been in use for many months and has proved entirely satisfactory.

FIG. 2.—The apparatus in position.

4. The Macintosh laryngoscope is preferred to other models. It sometimes happens that the Magill's tube is deflected towards the oesophagus at a tangent to its curved blade. To overcome

this little difficulty various types of simple introducers have been used to direct the tip of the tube into the glottis.

Discussion

The merits of the method described are its speed, simplicity, and freedom from hurry; the absence of complicated apparatus and of bulky appliances near the operating field; the good relaxation; the absence of risk of explosion; and the rapidity of recovery and freedom from unpleasant symptoms.

It may be thought that there is danger in the immediate post-operative period of aspirating blood or other material owing to residual weakness from the curare and to insensitivity of the upper air-passages from the "cocainization." In practice it is generally found that both the cough reflex and the power to cough have returned by the end of the operation. The patient, however, is turned semi-prone with the head low to lessen this risk when it is present.

The surgeons on whose cases this method has been used have not reported any increased tendency to bleeding. The table is tilted 10 degrees, head up, to diminish bleeding whenever the operation allows.

Other agents are in use for procuring the initial relaxation for intubating. By some, thiopentone is used alone, while others add cyclopropane. But in my opinion there is no agent which is so quick, so certain, and so safe as curare.

Medical Memoranda

Bilateral Abductor Laryngeal Palsy in Syringomyelia

The under-noted case is worthy of record because it demonstrates the importance of laryngological examination in cases of nervous disease even when there is no disturbance of voice and involvement of the larynx is unsuspected.

RECORD OF CASE

A chaplain, aged 33, had for about seven years been aware of sensory disturbances in the hands and left leg. He noticed that when taking a hot bath the heat was not appreciated by the affected parts although temperature sensation was normal elsewhere. He paid little attention to these symptoms.

About three months previous to his present admission to hospital he had felt ill with headache and general malaise. Thinking that he had influenza, he reported to his doctor, who found that he had a temperature of 101°F. (38.3°C.), but no abnormality in throat or chest. It was then discovered that there was a large area of cellulitis over the posterior aspect of the right elbow. In a normal person this would have caused considerable pain, but, apart from the fever, the patient was unaware of its presence.

Neurological examination showed that the left leg was stiff on walking. There was marked muscular wasting of the left hand, and the grip was weak. The left eye had a small pupil and narrowed palpebral fissure (Horner's syndrome). Sensation for touch was diminished on both sides of the face and over the right side of the trunk. Appreciation of painful stimuli and of heat was lost over the chest, both arms, left side of the abdomen, and left leg. Knee- and ankle-jerks were more pronounced on the right side than on the left. Abdominal reflexes were present on both sides. An extensor plantar response was elicited on the left side. A diagnosis of syringomyelia was made.

The patient attended for rhinological examination on account of nasal obstruction and catarrh. One year previously the septum had been resected with improvement in nasal patency but little effect on the discharge. He had no complaint with regard to his voice, which in the exercise of his calling was of paramount importance to him. During the past month, however, he had noticed a tendency to become breathless on exertion.

Examination revealed a chronic infection of the right maxillary antrum, with pus in the middle meatus. There was pus in the right choana, and the posterior edge of the septum was markedly swollen. Palatal, pharyngeal, and lingual movements were normal. There was some diminution in sensation in the pharynx, but no