INTRAVENTOUS PETHIDINE AND FLAXEDIL IN ANÆSTHESIA FOR THORACIC OPERATIONS

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In a previous communication (Mushin and Rendell-Baker, 1949), we drew attention to the intravenous administration of Pethidine as a means of reinforcing nitrous oxide and oxygen anaesthesia. We have now been using, for over a year, a combination of Pethidine and Flaxedil (Mushin et al., 1949) (tri-(diethylaminoethoxy)-benzene triethyliodide) against a background of nitrous oxide and oxygen anaesthesia, for most types of surgery. The results have been gratifying to all concerned. In particular, by the introduction of this technique, anaesthesia for thoracic operations in our hands has undergone what appears to us and our colleagues as a marked change for the better.

Hypoxia is inseparable from simple nitrous oxide and oxygen anaesthesia in normal subjects. The addition of other more potent drugs is a necessity, if adequate, let alone good, oxygenation is to be maintained. In the literature of nitrous oxide anaesthesia these facts have been universally recognized and such supplementation has ranged from chloroform, ether and trichlorethylene on the one hand to intravenous drugs such as thiopentone on the other.

The drawbacks of chloroform and ether in thoracic anaesthesia need no elaboration. We will only point out here that in the case of the former, not only its general toxicity, but the special dangers attaching to its administration in cardiac surgery militate against its use, while of the latter, inflammability, the increased flow of secretions and the
probability of post-operative sickness and slow recovery are against it.

Morphine was for long the trusty friend of those who made nitrous oxide their mainstay in anaesthesia. The inevitable respiratory depression which follows heavy morphinization may not be a serious matter after surgery in other parts of the body, but it is certainly a deterrent in the case of thoracic surgery. Rapid recovery of respiratory function and reflexes are essential if pulmonary complications are to be reduced. In recent years barbiturates have been substituted for morphine as a supplement to nitrous oxide. The barbiturates, however, whether in the shape of pentobarbitone or thiopentone, are primarily hypnotics with little analgesic action. The doses needed to obtund pain and reflex activity may be very large—verging on overdose—and the use of these drugs in thoracic surgery may be followed by alarming delay in recovery. Although it is true, as Gray (1948) has shown, that skill in the combination of small doses of barbiturate and curare with nitrous oxide avoids this hazard, it seems to us that as a supplement to nitrous oxide and oxygen a specific analgesic is more rational than a hypnotic. The ideal drug for this purpose would have a high analgesic potency with little respiratory depressive effect. Such a drug would control reflexes from all but the most painful stimuli, for in the latter case reflex movement could easily be stopped by the addition of a relaxant. With such a combination of drugs the patient would be unconscious due to the nitrous oxide, while his reflex activity would be damped or obliterated by a judicious combination of analgesic and relaxant.

We have tried a variety of analgesics for this purpose, including morphine, codeine, heroin, Pethidine, Phystone, Heptalgin and others. The first three of these are too de-
pressant; we have not persisted in their use. With respect to the rest we have mostly used Pethidine, since we have so far been unable to devise any method of assessment whereby the superiority of one over the other could be determined.

The clinical material on which we have based our opinion is that of a busy thoracic centre at Sully Hospital in South Wales. Over a hundred anaesthetics for thoracic operations were administered with this technique. Of these operations one-third were lobectomies and pneumonec- tomies; one-third thoracotomies performed for other reasons, and one-third thoracoplasties of various stages. At this centre surgeons, anaesthetists and nursing staff are familiar with thoracic surgery and anaesthetics, and are able to assess in a general clinical manner and with some accuracy how satisfactory an anaesthetic is for this type of work. We have found this method of assessment as reliable as any in evaluating an anaesthetic technique. The ease with which the patient is kept immobile and respiration controlled, the absence of reflex, cardiac, bronchial or respiratory phenomena, the rapid awakening and notable absence of post-operative shock, sickness and the need for resuscitation were all observations which were striking to the team. Diathermy was freely used throughout every operation; the explosion hazard was absent.

THE ANAESTHETIC

The average adult receives a moderate preliminary dose of papaveretum and hyoscine some 1½ hours before arrival in the operating theatre. On the operating table about 0.5–0.7 g. of thiopentone and about 80 mg. of Flaxedil are injected intravenously but separately, the Flaxedil being sandwiched between two doses of thiopentone. The face mask is applied and pure oxygen is administered—if
necessary by inflation of the lungs for about half a minute.
The patient is now a brilliant pink and is either breathing
very quietly or in temporary apnoea, and in either case in a
state of relaxation. Tracheal or bronchial intubation or
bronchial occlusion is now carried out. Nitrous oxide and
oxygen is then administered, using 'to and fro' absorption.
About one litre each of nitrous oxide and oxygen is an
average setting for the flowmeters. The expiratory valve
or a blow-off hole is adjusted so that no distension of the bag
occurs. Spontaneous breathing should be well established
by now and the patient placed in position. Pethidine 50 mg.
is injected intravenously by means of a saline drip or
diaphragm needle. Additional intravenous doses of 25 mg.
of Pethidine with or without 20 mg. of Flaxedil are injected
whenever they appear to be necessary, and on the average
this occurs about every half-hour. Indications for another
dose of Pethidine and/or Flaxedil might be a movement of
the fingers or toes, resumption of natural breathing when
this is not desired by the anaesthetist, or rise of blood-
pressure or pulse rate when no cause other than light anaes-
thesia appears to be present. In general, when spontaneous
breathing is desired, more Pethidine than Flaxedil is used,
the reverse being the case when apnoea and controlled
breathing is wanted. The maximum dose of Pethidine we
have used has been 280 mg. during a four-hour lobectomy
in a robust adult.

The pulse and blood-pressure readings throughout these
operations show little fluctuation, while pulse irregularities
have not been seen. This is in marked contrast to similar
cases in which cyclopropane was used. This observation
suggests that this combination of drugs is especially suitable
for operations upon the heart.

At the end of the operation, neostigmine and atropine are
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injected, to neutralize any Flaxedil effect present, for it is considered desirable in these operations to have the patient return to consciousness within a few minutes of the completion of surgery. Success in this latter aim must not result in a patient who awakes to full sensation of pain not dulled now as in former times by lingering traces of ether. If such is the case, active co-operation from the patient may be lost in his preoccupation with pain. When Pethidine and Flaxedil have been administered in the manner described, followed by neostigmine and atropine, the patient awakes with little discomfort. At the conclusion of the anaesthetic he opens his eyes on the operating table and usually answers “Fine” when asked how he feels. From that moment he is able to co-operate with his attendants, coughing and exercising as required.

For their introduction to this method of anaesthesia the authors are indebted to Dr. William Neff, of Stanford University School of Medicine, San Francisco, who has just published (Neff, et al., 1950) his own views on the subject.

SUMMARY

A method of anaesthesia for thoracic surgery is described, consisting of the administration of nitrous oxide and oxygen by inhalation, supplemented by intermittent intravenous injections of Pethidine and Flaxedil. By this means unconsciousness, immobility, control of respiration and of reflex activity are maintained. Awakening is immediate, and postoperative shock absent. The explosion risk is avoided.

REFERENCES