

# South African Medical Journal

## Suid-Afrikaanse Tydskrif vir Geneeskunde

P.O. Box 643, Cape Town

Posbus 643, Kaapstad

Cape Town, 16 June 1956  
Weekly 2s. 6d.

Vol. 30 No. 24

Kaapstad, 16 Junie 1956  
Weekliks 2s. 6d.

### INTERMITTENT DILUTE SCOLINE IN MAJOR AND MINOR SURGICAL PROCEDURES\*

JACK ABELSOHN, M.B., CH.B. (CAPE TOWN), D.A., F.F.A. (R.C.P. & S., ENG.)

*Cape Town*

With the introduction of Scoline as a relaxant drug of short-acting duration, a very definite advance has been made in the progress towards the attainment of smoother, more rapid and, at the same time, safer anaesthesia.

The initial use of Tuberine and Flaxedil profoundly influenced the whole trend of modern anaesthesia; operative procedures which formerly were regarded as being distinctly hazardous, especially in the aged, were converted into merely unpleasant surgical interludes, by virtue of the facility afforded to the surgeon by the utilization of these relaxants. It was inevitable, however, that the early use of these powerful relaxant drugs would be accompanied by errors of judgment, misapplication and, possibly, even abuse, by those inexperienced in their administration. The potential danger of the prolonged paralysing effect acting synergistically with other drugs probably accounted for those fatalities which occurred in the immediate post-operative period.

The advent of Scoline heralded a newer and safer approach to the problem of the paralysed intercostal muscle. Here we have a drug which produced profound muscular relaxation very rapidly, and whose action tended to pass off within a very short period of time with apparently no toxic or side effects—an ideal drug for the shorter surgical procedure, and one which could be used by the anaesthetist with reasonable confidence that, because of its controllability and relative wide margin of safety, resort to antidotes to counteract its paralysing action would rarely be necessary.

Investigators have reported no appreciable effect on the cardio-vascular system with single-dose injections,<sup>1</sup> and as it does not liberate histamine it does not

produce bronchospasm.<sup>1</sup> It appears to be perfectly safe to use in conjunction with other known anaesthetic agents, but should not be mixed with Pentothal, which it will precipitate.

The early clinical use of Scoline was confined mainly to intubation, electro-convulsive therapy and manipulations. The present-day wide range of its use has been described by numerous authors with varying techniques for its administration.

Clinical experience seems to indicate that the dosage and concentration of Scoline as used according to the generally accepted standard is greatly in excess of what is really required. It has always been my contention that powerfully depressant drugs should be used in as dilute a solution as possible, to minimize the degree of *ultimate* depression, particularly where a series of these depressant drugs are being administered intermittently, and the synergistic effect of the whole might well be profound. On this principle, a 2.5% solution of Pentothal is generally preferred to the 5% solution, and a 0.5% solution of Pethidine (100 mg. diluted down to 20 c.c. with sterile water) is used for intermittent injection, working exceedingly well, and never giving rise to any anxiety. In the same way, Scoline can be diluted down to varying percentages, viz. (a) 2 c.c. (100 mg.) diluted down to 20 c.c. with sterile water, making a 0.5% solution, or (b) to 10 c.c., making a 1.0% solution, or (c) to 5 c.c., making a 2.0% solution.

If the drug is thus diluted, a considerably *smaller total amount* is required, thereby increasing the margin of safety.

The ultimate response to Scoline is dependent on the level of pseudo-cholinesterase in the plasma<sup>2,3</sup> (Scoline is destroyed by pseudo-cholinesterase). A low serum-cholinesterase level is the cause of undue sensitivity to Scoline, the prolonged response being due to the delay in the destruction of the drug.<sup>4</sup>

\* A paper presented at the South African Medical Congress, Pretoria, October 1955.

It seems reasonable to assume, in the light of clinical experience, that *dilute concentrations of Scoline used in smaller total quantities* must, in the event of a low cholinesterase level, be more efficiently dealt with by the enzyme. Where dilute solutions are used, a more rapid return of voluntary respiration is achieved, and it is possible to maintain voluntary respiration for long periods with a simultaneous adequate degree of relaxation. Assisted respiration may occasionally be required should a reduced amplitude of spontaneous respiration occur for brief periods.

Continuous drip techniques are not always practical, and it is suggested that by using intermittent injections of 0.5% Scoline, it is possible to obtain complete relaxation in the lower abdomen whilst retaining adequate voluntary respiration.

When Scoline is to be used, premedication should be light, e.g. 1/3rd gr. of Omnopon or 100 mg. of Pethidine, plus 1/100th gr. of atropine. Induction is carried out with a 2.5% solution of Pentothal. Intermittent injections of 2.5-5 mg. of 0.5% Scoline will provide complete relaxation with voluntary respiration. Maintenance of anaesthesia is obtained by a choice of either Pentothal gas and oxygen, gas-oxygen and ether, or gas, oxygen and Trilene. The addition of a small quantity of ether will lessen very considerably the total amount of Scoline used, and I do not hesitate to use it.

#### *Some Indications for the Use of Scoline:*

The following is a list of conditions in which the use of Scoline is indicated:

1. Lower abdominal surgery, viz appendectomy, prostatectomy, herniotomy, hysterectomy, ovariectomy, etc.
2. Rectal surgery, viz for piles, fissures, fistulae, polyp.
3. Intubation.
4. Bronchoscopy.
5. Bronchography.
6. Oesophagoscopy.
7. Pyelography.
8. Cautery to the mouth, nose and face.
9. Closure of peritoneum.
10. To overcome a prolonged or severe Pentothal spasm.
11. Manipulations.

#### TECHNIQUE OF ADMINISTRATION

##### *Appendectomy, Herniotomy, Rectal Surgery, Hysterectomy, Myomectomy, Ovariectomy, etc.*

An initial injection of  $\pm 0.5$  g. of 2½% Pentothal is given, followed by gas and oxygen: a Mitchell needle is inserted and approximately 15-20 mg. of 0.5% Scoline injected. During the initial period of apnoea ether may be introduced if desired; it is usually tolerated well. Intermittent injections of 2.5-5 mg. of Scoline (0.5%) are administered during the operation to maintain relaxation. The patient breathes voluntarily, the degree of relaxation is excellent, and recovery from the anaesthetic is rapid. Assisted respiration may occasionally be required for brief periods, should spontaneous respiration of a reduced amplitude occur.

Anaesthesia can be maintained by a choice of several methods, viz. (1) gas, oxygen and intermittent Pentothal or Pethidine, (2) gas, oxygen plus an ounce or two of ether, or (3) gas, oxygen and Trilene.

With obese and muscular patients for hysterectomy,

ovariectomy, etc., intubation is preferable; a few ounces of ether is then administered at the commencement, and anaesthesia and relaxation are subsequently maintained by intermittent injections of 2.5% Pentothal and 0.5% Scoline.

#### *Intubation*

Anaesthesia is induced with 2.5% Pentothal and, depending on the build and age of the patient, the initial dose varies from about 15 to 24 c.c. In the aged and very young this amount is proportionately reduced, and it is increased if necessary in the muscular athletic type.

Two cubic centimetres of Scoline (100 mg.) are now diluted to 10 c.c. (a 1% solution) and after adequate oxygenation 25-50 mg. are injected. After further oxygenation, intubation is performed. Ether in a high concentration can be introduced during the period of apnoea, which is comparatively brief, and subsequent anaesthesia can be maintained with either gas, oxygen and ether (or Trilene), or gas, oxygen and Pentothal (or Flaxedil or Tubarine). The application of topical anaesthesia to the cords and trachea, where possible will minimize the 'bucking' which often accompanies the return of voluntary respiration. Intermittent injections of Pentothal or 0.5% Scoline (2.5-5 mg.) or dilute Flaxedil will also aid in overcoming the tendency to 'bucking'.

In children, about 20 mg. of 0.5% Scoline usually suffices for intubation.

#### *Bronchoscopy*

In both adults and children, bronchoscopy can be accomplished with ease under Scoline. After anaesthesia has been induced with Pentothal, a Mitchell needle is inserted and about 50 mg. of 1% Scoline is injected, which is usually sufficient for the passage of the bronchoscope. Oxygen is run through the bronchoscope via the inlet, and gentle intercostal manipulation can be resorted to, to aid oxygenation, should the examination be prolonged; the simple manoeuvre of occasionally plugging the mouth of the bronchoscope with the finger will assist ventilation. Intermittent injections of 5-10 mg. of Scoline are given when necessary—and also Pentothal if required.

With children 0.5% Scoline is used and 10-20 mg. are required for the passage of the bronchoscope; intermittent injections of 2.5-5 mg. may be required if the examination is prolonged.

#### *Bronchography*

One per cent Scoline is used, and after induction of anaesthesia with Pentothal, 50-100 mg. are injected, and the patient is intubated with a cuffed tube. After adequate oxygenation, the Lipiodol is inserted *via* a catheter, and the patient is postured and X-rayed. Insufflation of oxygen through the catheter with occasional intercostal ventilation will usually suffice to maintain the patient adequately oxygenated. Subsequent injections of Pentothal and Scoline ( $\pm 10$ -20 mg. per injection) are given *via* a Mitchell's needle to maintain anaesthesia and apnoea, should further plates be required.

My initial enthusiasm for using Scoline for bronchography in children has been tempered very greatly by three unpleasant episodes in which the apnoea produced by the Scoline was followed, after the introduction of the Lipiodol, by severe anoxia, which was only relieved after withdrawal of the tube and inflation with oxygen. In one instance the anoxia persisted for some considerable while, even after withdrawal of the tube. Frankly, I have never been very happy about bronchography in children, and in this operation I now consider Scoline as definitely contra-indicated, and should greatly appreciate other opinions.

### *Oesophagoscopy*

#### *Cautery to the Mouth, Nose and Face*

Intubation is performed under Pentothal and  $\pm 40$ –50 mg. of 1% Scoline. Topical anaesthesia is an advantage, but intermittent injections of Scoline can be given to 'hold' the tube. Gas and oxygen is administered simultaneously.

### *Closure of Peritoneum*

Intermittent injections of 0.5% Scoline will provide adequate relaxation when the effects of the long-acting relaxant have passed off.

### *Pentothal Spasm*

A prolonged or severe Pentothal spasm can be rapidly controlled with a small dose of Scoline.

### *Scoline Apnoea*

In my early series of cases, where undiluted Scoline had been used, two patients had prolonged apnoea, lasting 35 minutes and 45 minutes respectively. In the latter case, an intravenous injection of Coramine restored voluntary respiration quite dramatically—but this may have been coincidental. Lehman<sup>4</sup> suggests transfusion of fresh blood or plasma to counteract prolonged apnoea giving rise to anxiety.

As Prostigmine prolongs the action of Scoline,<sup>5</sup> it must only be given if one can be reasonably certain that all the Scoline has been hydrolysed.<sup>1</sup> Gray records a case which returned to a state of apnoea after Prostigmine.<sup>6</sup>

### REFERENCES

1. Bourne, J. G. *et al.* (1952); *Lancet.*, **1**, 1225.
2. Glick, D., (1941); *J. Biol. Chem.*, **137**, 357.
3. Bovet-Nitti, F., (1951); *Arch. Int. Pharmacodyn.*, **88**, 1.
4. Lehman, H., (1952); *Lancet*, **2**, 199.
5. Castillo, J. C. and de Beer, E. J. (1950); *J. Pharmacol.*, **99**, 458.
6. Gray, T. C. (1952); *Lancet*, **2**, 40.