DECAMETHONIUM IN ANAESTHESIA FOR CAESAREAN SECTION

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INTRODUCTION

Since the introduction of decamethonium into clinical use (Organe, Paton and Zaimis, 1949) its use as an adjunct in anaesthesia has been abandoned in many centres because of the fear of prolonged apnoea (Gray, 1950). However, Fisk (1961) found that because of its reliable action, its sharp end-point, the absence of cardiovascular side-effects and its safe combination with succinylcholine, there is still much scope for its use. Lawson (1958) had recommended that it was especially useful in anaesthesia for caesarean section. The drug was found not to cross the placental barrier (Young, 1949; Moya and Thorndike, 1962). In addition, it was found that newborn infants were resistant to the action of decamethonium (Churchill-Davidson and Wise, 1963; Moya and Thorndike, 1963).

This report comprises a series of 102 caesarean sections where decamethonium was effectively and safely used as an adjunct to anaesthesia.

METHOD

One hundred and two cases of caesarean section were anaesthetized according to the procedure set out below during the course of normal duty in the Anaesthetic Unit at Kandang Kerbau Maternity Hospital, Singapore, over a period of 16 months (March 1962-June 1963). During this period, only one case was rejected for the use of decamethonium because of severe toxaemia of pregnancy with albuminuria, and another did not undergo general anaesthesia because of cachexia due to advanced nasopharyngeal carcinoma.

The Procedure

Premedication of intravenous atropine (gr. 1/100-1/50) was given. Pre-oxygenation in a 'head-up' position for 5 min. preceded rapid induction with cyclopropane (200-400 c.c./min.) in oxygen (600 c.c./min.) in a closed circuit using Boyle's machine. Cuffed endotracheal intubation was done under succinylcholine (25-100 mg.) relaxation and intermittent positive pressure respiration was instituted with a gas flow of nitrous oxide (4 1/min.) and oxygen (4 1/min.). Muscle relaxation was maintained with decamethonium (2-10 mg.) and as soon as the baby was delivered and intravenous ergometrine given, the gas mixture was changed to nitrous oxide (5 1/min.) and oxygen (2 1/min.). Occasionally, in prolonged operations, additional doses of succinylcholine or cyclopropane had to be given. The endotracheal tube was removed when spontaneous respiration and consciousness had returned. During decamethonium paralysis, resuscitative measures for the mother or the newborn infant could be performed. The blood pressure of the mother was monitored, and observations were made on the duration of action of the drugs used and on the Apgar rating of the newborn infant.

Cases which presented with obvious contraindications e.g. electrolyte imbalance, cachexia and muscle dystrophy (Lawson, 1958) were not subjected to decamethonium treatment.

RESULTS

The average age of the subjects was 30 (ranging from 17-44 years old). The mean weight was 54 ± 0.7 kg. (ranging between 36 and 74 kg.). The indications for caesarean section were quite varied, with placental disorders and cephalopelvic disproportion (C.P.D.) foremost. The distribution is illustrated in Table I.

TABLE I

DISTRIBUTION OF INDICATIONS FOR CAESAREAN SECTION

Indication	No. of Cases Out of 102
Placental disorders (antepartum haemorrhage 15)	38
Previous L.S.C.S.	16
Cephalopelvic disproportion	14
Foetal distress	13
Prolonged labour	10
Elective	10
Abnormal presentation (prolapsed cord 4)	6
Maternal distress	2
Elderly primip with inertia	2
Foetal death	1
Mild pre-eclamptic toxaemia	1

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Series of 102 cases taken from one medical officer's normal course of duty in the Anaesthetic Unit at the Kandang Kerbau Maternity Hospital, Singapore, over a period of 16 months. The estimated total number of obstetric anaesthesias given by the Anaesthetic Unit over the same period was 1,000.

Only six operations were of the classical type, the remainder being lower segment caesarean sections (L.S.C.S.). One was a hysterotomy done for a ruptured uterus with a dead foetus.

The dose of succinylcholine ranged from 0.5-5.56 mg./kg. with a mean of 1.5 mg./kg. The duration of action ranged from 2-46 min. with a mean of 13.2 min. This would give an average of 8.8 min./mg./kg.

Decamethonium

The mean dose of decamethonium used was 93 µg./kg. (61-147 µg./kg.) and the mean duration of action was 26.3 min. (15-58 min.). This gave an average of 5 mg. in a 54 kg. subject for 26 min. of muscle relaxation. The duration of action was not dose-dependent. Instances of prolonged apnoea were seen after heavy sedation with tranquilisers and in dehydration (Table III). There was no change in the blood pressure on administration of decamethonium.

Effects on the Infant

The resultant condition of the newborn infant could be influenced by obstetric factors, by the general anaesthetic or by the persistence of the muscle relaxant used. The mean induction-delivery time (I.D.) for the series was 15 min., by which time the effects of cyclopropane would have been washed out. The mean time between the injection of decamethonium and delivery was 9.3 min. When this was subtracted from the average time for the duration of action of decamethonium (26.3 ± 0.9 min.) the period during which the drug would continue to act in the mother could be extrapolated to be present in the neonate if the drug crossed the placental barrier, and is termed the *persistence factor (pf)*. The mean *pf* was 17 min.

Apgar Rating

The mean Apgar rating in the series was 8 ± 0.03. However, the outcome of the operations were not favourable in 12 out of 102 cases where the Apgar rating was below 7. Out of this, one was a foetal death before the operation, and another died due to obstetric causes. The other 10 had bad obstetrical histories (Table II). The mean I.D. in the 'poor cases' was 15 min. (7-30) also, and the mean *pf* in these cases was 15 min., a period which was even shorter but not significantly different from that of the others in the series (17.9 min.). This seems to suggest that neither the anaesthetic nor decamethonium was responsible for the need to institute resuscitative measures taken in 8 out of the 10 poor cases. In any case, the Apgar rating was 9-10 in all live cases after 10 min.

CONCLUSION

The results showed that decamethonium seemed to have a sharp end-point, and was found not to affect blood pressure, whilst its duration of action did not seem to depend on dose administered. In addition, there seemed to be no effect on the newborn infant. The duration of action of 20-30 min. was most suited to local conditions, as that was the period during which the anaesthetist could institute resuscitative measures to the neonate in the absence of the paediatrician, or to the mother, and would be just long enough in most cases, for the operation.

Prolonged apnoea was seen with repeated administration and in a case of dehydration with possible electrolyte imbalance as was found by Lawson (1958). In addition, this was also brought about by heavy sedation with tranquilising drugs and their combination with narcotics. The question of dual block would not arise if the total amount given did not exceed 10 mg. (Fisk, 1961).

The report indicates that decamethonium has a definite place as an adjunct to anaesthesia for caesarean section and that its abandonment is groundless.

SUMMARY

A series of 102 cases of caesarean section was done with decamethonium as an adjunct to anaesthesia. 12 cases delivered neonatal infants with an Apgar rating below 7, but the causes did not seem to arise from either the anaesthetic or from decamethonium. It is proposed that decamethonium has a definite place in the anaesthesia for caesarean section.

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