

## THE USE OF SHORT ACTING MUSCLE RELAXING DRUGS IN OBSTETRICAL ANAESTHESIA\*

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It is now over twelve years since Dr. Harold Griffith (1) first introduced the use of muscle relaxants into the field of anaesthesia. Since that time, they have been widely used and much has been written about them in relation to surgical anaesthesia. However, this is not the case regarding obstetrical anaesthesia, where the advantages of these drugs seem to have been overlooked by most anaesthetists.

Over the past three years the various members of our group have used muscle relaxants combined with light general anaesthesia for 591 deliveries.

The first muscle relaxant chosen for study was Sincurine or decamethonium bromide. This drug was chosen because of its effectiveness in producing good muscular relaxation and, compared to d-tubo-curare, for its relatively short action. Besides being the first relaxant studied, it has become with us the most popular one for obstetrical anaesthesia, for reasons we shall see later.

Sincurine has now been given to 451 obstetrical patients, of which approximately three-quarters were primiparae. The reason for the high proportion of primiparae is that these are the cases that usually present more difficulty at time of delivery, and are the ones where relaxation is more difficult to obtain.

In regard to the dosage used, in this series it has varied from one to five milligrams in a single injection. In some cases, such as in twin deliveries, we have given a second injection a short time after the first, and in this manner we have reached a total dosage of seven milligrams within a period of twenty minutes. Early in the series we tended to use smaller doses, such as two, and two and a half milligrams, but lately we seldom go below three and often use four or five milligrams.

The anaesthetic used is a mixture of nitrous oxide and oxygen given in approximately 75-25 concentration. We have found that by increasing the dosage of Sincurine to three milligrams or more, we are often able to carry the patient through the entire procedure, including the repair of the episiotomy, without resorting to a stronger agent such as cyclopropane. There seems to be a synergistic action between Sincurine and nitrous oxide which enables one to do this. We feel it is an advantage to be able to avoid using cyclopropane, as this drug is depressing to the baby if given for more than ten minutes before delivery. If we can avoid it the patients are also less likely to vomit, and this is much appreciated by them and commented upon when we visit them a day or two later.

The patients who received Sincurine can be divided into three groups:

1. The first group is composed of those cases where the baby is a vertex

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presentation and the obstetrician wishes to proceed with a forceps delivery. These patients, who have been receiving a mixture of 75% nitrous oxide and 25% oxygen with their pains, are then given the selected dose of Syncurine intravenously. In two or three minutes they will be completely relaxed and the obstetrician can proceed with the delivery. This group constitutes over 90% of the total cases.

2. The second group are the breech deliveries where the relaxant is given to facilitate delivery of the after-coming head. Here the injection of Syncurine must be timed very accurately to ensure that there is maximum relaxation at the time the head is being delivered.

3 The third group comprises those cases which are progressing very rapidly and where there is danger that the baby will precipitate. The relaxant stops all voluntary pushing by the mother, so the head can be delivered gradually, avoiding undue damage to either the baby's head or the mother's perineum.

Now let us consider the effect of Syncurine on the maternal respiration. There is usually an apnoea of four to eight minutes depending on the amount of Syncurine given. With smaller doses such as one or two milligrams, there may be merely respiratory depression, but with the larger doses there is usually an apnoea. The longest recorded in our series was eighteen minutes. During this time the patient is adequately oxygenated by manual compression of the breathing bag. It is most important that the mother receives a good supply of oxygen at all times. If the controlled respiration is carried on with extreme vigor the period of apnoea can be prolonged further.

The next and very important consideration is the effect on the baby. The fear that there would be placental transmission of the relaxant to the baby has made many people hesitate to use them in obstetrical cases. From this series it appears to be quite definite that Syncurine is not transmitted across the placenta in any effective concentration. In this series 94% of the babies required no resuscitation. Of the remainder, about half had an obvious cause for their difficulty, such as the umbilical cord being pulled tight about the baby's neck. Auscultation of the maternal abdomen in these cases often reveals a slow fetal heart rate prior to delivery. About 3% of babies required resuscitation for no apparent reason. This figure is extremely low, and we feel this amount of difficulty would be encountered in any similar series, regardless of anaesthetic agents.

The question of placental transmission of Syncurine is very interesting and various anaesthetists have held divergent views on this subject. Ellerker (2), writing in the British Medical Journal, felt that it did cross the placenta, although at a slower rate than d-tubo-curare, and that it caused depression in some babies. On the other hand, Organe (3), on the basis of his clinical experience, felt it was quite safe. Dr. Young (4) did some interesting experiments using Syncurine on pregnant rabbits and guinea pigs, wherein she definitely showed that the placenta was an effective barrier to the transmission of the Syncurine. The majority of those writing on Syncurine in recent years feel the placenta is a barrier to its transmission. We concur with this viewpoint.

Another advantage of Syncurine is that the obstetrician is nearly always able to deliver the placenta without delay. This would indicate there was no de-

pression of uterine tone by the Syncurine, and the uterus is able to respond to the injection of pitocin which is usually given immediately following the birth of the baby. This is attributed to the fact that the mother is being carried in a lighter plane of anaesthesia so that the uterine contractions are not slowed down as they would be by any of the more powerful agents such as ether or cyclopropane. In their article on this subject, Austin and Mering (5) state that Syncurine does not interfere with uterine contractions.

The incidence of episiotomies was not reduced greatly, as 72% of the cases required them. However, the size of the episiotomies was markedly reduced. In discussing this matter with the obstetricians, their impression was that they were often able to deliver the baby using a much smaller episiotomy than would otherwise have been required if a relaxant had not been used.

When the succinylcholine group of relaxants appeared we decided to give them a trial to learn if they had any advantages over Syncurine. To date we have used this group on 140 cases. The drugs studied were Anectine and Winthrop 7907, which are both the chloride, and Brevdil which is the bromide. All forms are equally satisfactory, but the dosage of the chloride and the bromide differ slightly in relation to the proportion of the active cation in the two compounds.

Of the 140 cases, only 37 were multiparae. Forceps were used in 80% of the cases. The succinylcholine relaxants were given in the same manner as that described for Syncurine and excellent relaxation was achieved.

There are some differences noted in this series as compared to the previous one:

1. The onset of relaxation is quicker than with Syncurine. Whereas with Syncurine it takes three or four minutes to get good relaxation, it only takes a minute with the succinylcholine group. This is useful when you require immediate relaxation as for the delivery of the head in breech presentations.

2. The period of relaxation and of maternal apnoea is shorter with the succinylcholine group. Most patients breathe adequately in three or four minutes, and this is distinctly advantageous where there is any difficulty with the resuscitation of the baby. We are also responsible for the resuscitation of the child, and so whatever measures are necessary can be instituted immediately.

3. If there is a large episiotomy, or if the obstetrician is slow with his repair, it is usually necessary to supplement the nitrous oxide with some more potent agent, such as cyclopropane or ether. These agents increase the incidence of vomiting. Therefore recovery is not as pleasant as when only Syncurine and nitrous oxide are required.

Again with this series of relaxants, resuscitation of the babies presented no difficulty. In only seven out of the 140 cases were moderate measures required, and in four of these there were obvious causes for the depression, such as an excess of opiate given to the mother, or a tight cord around the baby's neck. Only three of the 140 cases required moderate resuscitation where there was no apparent cause; this we feel is an acceptable percentage.

From this series it appears that the placenta is also an effective barrier to the passage of the succinylcholine group of relaxants. It may be that they are de-

toxified by the pseudo-cholinesterases in the mother's body before they reach the placenta.

The dosage in this series has ranged from 10 to 70 milligrams, with an average dose of 30 to 40 milligrams. Except for a few cases where very small doses were given, all the patients developed apnoea. As mentioned previously, the period of apnoea with this group of drugs is quite short, and lasts only two or three minutes. Assisted or controlled respiration was instituted wherever necessary to make certain the patient received an ample supply of oxygen at all times.

On the basis of this series of 591 deliveries we feel that the muscle relaxants offer advantages to all concerned. These are—

1. *Advantages to the baby.* By the addition of muscle relaxants much lighter general anaesthesia can be given to the mother and so the baby receives proportionately less anaesthetic and is less depressed. Also by having the muscles of the mother's perineum completely relaxed, much strain and trauma to the baby can be removed.

2. *Advantages to the mother.* With the complete muscular relaxation afforded by these drugs, smaller episiotomies have proved to be adequate and extension of episiotomies by tears have become infrequent. As a result less damage has been done to the perineum, and this is obvious at the time of the mother's six-week checkup. The decreased incidence of vomiting is much appreciated and is another advantage of this technique.

3. *Advantages to the obstetrician.* The completely relaxed musculature facilitates operative procedures and enables the obstetrician to deliver the baby deliberately and without trauma.

4. *Advantages to the anaesthetist.* Obstetrical patients are often poorly premedicated, and so are much more likely to develop complications such as excess salivation and laryngeal spasm. The addition of muscle relaxants tends to prevent such complications and makes the anaesthetic much smoother.

In conclusion we feel that muscle relaxants are a very definite asset in the field of obstetrical anaesthesia. They should not be used by untrained personnel, but in the hands of a trained anaesthetist they offer many advantages to the mother, baby and obstetrical team.

#### SUMMARY

Decamethonium Bromide and Succinyl Choline have been used in combination with nitrous oxide anaesthesia to produce muscular relaxation for the vaginal delivery of 591 obstetrical patients. There has been no evidence of placental transmission of these drugs to the baby. The use of these drugs has made possible the employment of lighter general anaesthesia, smaller episiotomies, and control of precipitate delivery. Advantages have accrued to the baby, and the mother, and to the obstetrician and the anaesthetist.

#### RÉSUMÉ

Le Bromide de Decamethonium et le Succinyl Choline ont été employés en combinaison avec l'anesthésie à l'oxyde nitreux pour produire le relâchement musculaire pour l'accouchement vaginal de 591 patients. Il n'y a pas eu in-

dication de transmission placentale de ces drogues au bébé. Ces drogues ont rendu possible l'emploi d'une anesthésie générale plus légère, des incisions plus légères de la vulve, et le contrôle des précipités d'accouchement. Les avantages ont augmentés en nombre pour le bébé, la mère, l'accoucheur et l'anesthésiste.

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