THE USE OF SUXAMETHONIUM INFUSION IN ANAESTHESIA FOR ADENOTONSILLECTOMY

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SUMMARY

An anaesthetic method using the sequence intravenous thiopentone, nitrous oxide and oxygen with suxamethonium infusion for adenotonsillectomy is described. Its value with special reference to minor complications is discussed on the basis of 300 cases anaesthetized with this method.

There is a difference of opinion concerning the most suitable agents and techniques for anaesthesia for adenotonsillectomy in children. The essential requirements of an anaesthetic for tonsillectomy are, however, both clear and generally accepted:

1. a free airway, secure from intrusion of blood into the trachea;
2. relaxation of the pharyngeal and laryngeal muscles;
3. the return of reflexes at the end of the operation;
4. freedom for the surgeon from any hindrance by anaesthetic equipment;
5. adequate time for the surgeon to conclude the operation;
6. the freedom to use cautery or adrenaline infiltration if wanted.

The authors have found that working in a busy provincial hospital the following anaesthetic technique consisting of intravenous thiopentone, nitrous oxide and oxygen with muscular relaxation by suxamethonium drip meets all requirements. This method has now been used for over five years in Hyvinkää Hospital (about forty miles from Helsinki) and the following is an account of experience with it. Only one report of a similar method has been found in the literature, a series of 130 cases anaesthetized in ten months by Steel and Needs (1963).

MATERIAL AND METHODS

The series comprised 300 anaesthetics given in the period 1959–63 for adenotonsillectomy operations. There were 150 boys and 150 girls (age range 1–18, mean 7 years); the largest groups were those of 5–6 and 7 years. The commonest operation performed was adenotonsillectomy (166 cases; 55 per cent). On 73 patients (24 per cent) tonsillectomy alone was performed, on 59 patients (20 per cent) adenoidectomy, and in 2 cases (0.7 per cent) tonsillotomy. Prophylactic measures were taken against possible pre-operative respiratory infections and the condition of the children was in every case good. Every patient had the routine laboratory tests pre-operatively (blood, urine, chest radiograph). The patients stayed in hospital for 2–4 days.

The premedication varied, consisting in the years 1959–60 mainly of morphine and hyoscine (94 cases; 31 per cent) and thereafter mainly of atropine with pethidine alone (126 cases; 42 per cent) or combined with promethazine (54 cases; 18 per cent). In 26 cases (9 per cent) only atropine was given. The dose of morphine was 0.2 mg/kg body weight, of hyoscine 0.006 mg/kg, of pethidine 1–1.5 mg/kg, of atropine 0.01 mg/kg, and of promethazine 1 mg/kg.

Anaesthesia was induced with an intravenous sleep dose of thiopentone 2.5 per cent. The required dose ranged between 75 and 250 mg. The size of needle was 0.80 × 35 mm. When the child refused injection (39 cases; 13 per cent) anaesthesia was induced with nitrous oxide, oxygen and halothane. A Fluotec vaporizer was used. After the administration of suxamethonium (1 mg/kg) intravenously the lungs were carefully ventilated with oxygen and the trachea intubated. Cuffed tubes lubricated with cinchocaine oint-
ment were used, except for patients younger than 6 years, for whom plain tubes were mainly used.

Anaesthesia was maintained with nitrous oxide (5 l./min) and oxygen (2 l./min) and minimal amounts of halothane (0.5 per cent) were added if needed (excessive lachrymation or disturbing salivation). After the first voluntary movements, 0.2 per cent suxamethonium infusion was started, adjusting the drip rate so that controlled ventilation of the lungs was maintained. Moderate hyperventilation was used. The total dose of suxamethonium required ranged usually between 2 and 5 mg/kg body weight. For patients of under 6 years the Rees modification of the Ayre T-piece was used. For the older children a semiclosed, circulating system with Magill valve and Boyle carbon dioxide absorber was preferred. The tube was secured in the angle of the mouth opposite the tonsil under operation, and thus was changed once in the course of operation. The Boyle-Davis mouth gag was used.

In adenotonsillectomy cases the adenoidectomy was always done first. The tonsil beds were sutured with continuous catgut, and arterial bleeding points were sutured. The operation time varied between 5 and 40 minutes. After the operation the mouth and pharynx were cleared by suction, the patient was placed in a slight Trendelenburg position, oxygen was administered, and extubation was carried out first after the protective reflexes had returned and the child reacted to commands. The patient was now laid on the trolley in the prone position, with a pillow under the hips, head turned to the side, one arm and leg in flexion. After some minutes' observation the patient was taken to the ward. A sedative suppository was given if needed as postoperative medication.

**RESULTS**

Eighty-nine patients (30 per cent) had a raised temperature postoperatively (temperature 38°C on one day or 37.5°C on two days). In the adenotonsillectomy group (166 patients), 61 patients (37 per cent) had a raised temperature, in the tonsillectomy group (73 patients) 23 patients (32 per cent) and in the adenoidectomy group (59 patients) 5 patients (8 per cent) had a raised temperature. Postoperative vomiting occurred in 36 patients (12 per cent). Twenty-eight (9.3 per cent) vomited old swallowed blood once or twice and only 8 patients (2.7 per cent) vomited more than three times. There were no significant differences in the various premedication groups; the frequency in the morphine-hyoscine group was 16 per cent, and 11 per cent in the atropine-pethidine and atropine-pethidine-promethazine groups.

Postoperative restlessness was noted in 15 cases (5 per cent).

Transfusions were given during the operations or afterwards in 13 cases (4.3 per cent). In 3 cases (1 per cent) resuture was needed.

Postoperative stridor and hoarseness occurred in 5 patients (1.7 per cent); in 2 of them (0.7 per cent) it was severe.

Prolonged apnoea did not occur in this series and muscular activity was adequate within 5 minutes of the conclusion of the operation.

No other complications were noted.

**DISCUSSION**

There were no major complications in these 300 cases. The results obtained using this method compare favourably with those reported using other methods in large series of cases (for example, Pembleton, Walker and Gill, 1959; Ribeiro, 1960). Regarding the minor complications, comparisons are difficult because in the majority of published series there is an unfortunate lack of precise data concerning these.

A free airway with maximum security can be achieved only by endotracheal intubation. Regarding the disadvantages connected with intubation, Collins and Granatelli (1956) report hoarseness and stridor in 3.8 per cent of intubated cases. The frequency of 1.7 per cent reported here is of the same order, although smaller. It might be thought that with controlled pulmonary ventilation the tube would lie immobile and so irritate the larynx less. Steel and Needs (1963), using controlled respiration and cuffed orotracheal tubes, had no respiratory complications in 130 cases.

Considering the type of operation, the incidence of vomiting (12 per cent) and postoperative restlessness (5 per cent) is not high. Unfortunately the reports in the literature give no exact data in
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this respect, indicating that the minor complications have not yet been given due consideration.

The number of patients requiring transfusion is fairly large (4.3 per cent). It is known that suxamethonium dilates the capillary vessels (Halldin, Wahlén and Koch, 1959). In our cases the bleeding was, however, of the arterial type. According to Steel and Needs (1963) this kind of anaesthesia should prevent postoperative bleeding.

Prolonged apnoea did not occur, nor were cardiac arrhythmias noted. Cardiac function was followed with the aid of a stethoscope. Steel and Needs in 1963 published a report of 130 cases in which the anaesthetic technique was very similar to that described here, except that they used intermittent injection instead of continuous infusion of suxamethonium. They reported no cardiac complications. According to Lupprian and Churchill-Davidson (1960), the bradycardia or arrhythmia appears to be related to the size of the repeat dose used and not to number of doses or to the total amount of suxamethonium. Graf, Ström and Wahlén (1963) reported that intermittent suxamethonium can lead to serious disturbances of cardiac rhythm. The danger, however, is small in this method and it is found that, with careful attention, the risk of overdosage is no greater.

Contrary to reports of authors working with volatile anaesthetics, the art of premedication does not seem to play an important role in this kind of anaesthetic method, provided that there is no great respiratory depression and that the dose of atropine is adequate. Atropine is suggested by Lupprian and Churchill-Davidson (1960) as a safeguard against the cardiac effects of suxamethonium. The authors agree with this.

By way of summary, it can be concluded that the advantages of the method are: rapid induction; wholly relaxed operative field; freedom for the surgeon in choosing the operative technique; rapid awakening to full consciousness without postoperative excitement or tendency to laryngospasm; no relapse to anaesthesia; and infrequent postoperative nausea.

The disadvantages are that it requires more experience than the usual inhalation methods, and that there is the possibility of prolonged apnoea and cardiac arrhythmia. These are inherent in all techniques when suxamethonium is used.

REFERENCES


L'USAGE DES PERFUSIONS DE SUXAMETHONIUM DANS L'ANESTHESIE POUR LES AMYGDALECTOMIES

SOMMAIRE
Une méthode d'anesthésie comprenant l'association thiopenton intraveineuse, protoxyde d'azote-oxygène et perfusion de suxaméthonium est décrite pour l'amygdalectomie. La valeur de cette méthode est discutée sur la base de 300 applications pratiques; les complications mineures pouvant se voir avec cette méthode sont spécialement relevées.

DIE VERWENDUNG VON SUXAMETHONIUM-INFUSIONEN FUR DIE ANÄSTHESIE BEI DER ADENO-TONSILLEKTOMIE

ZUSAMMENFASSUNG
Es wird eine anästhesiologische Methode beschrieben, bei der nacheinander Thiopenton intravenös, Lachgas und Sauerstoff mit Suxamethonium-Infusion bei der Adeno-Tonsillektomie verwendet werden. Ihr Wert wird anhand von 300 nach dieser Methode anästhesierten Fällen mit besonderer Berücksichtigung kleinerer Komplikationen diskutiert.