

ANAESTHESIA FOR TONSILLECTOMY AND ADENOIDECTOMY IN CHILDREN¹

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THE ANATOMICAL ACCESSIBILITY and doubtful physiological value of the palatine tonsils are responsible for the fact that tonsillectomy accounted for approximately one-third of all operations carried out in the United States since 1924. (1). Depending on geographical location and social environment, 20 to 90 per cent of the population over the age of ten have already had their tonsils removed (2).

Mortality and morbidity are inevitably associated with surgery and are related to the condition of the patient, the nature and extent of the surgery and the efficiency of preparation, anaesthesia and management. Although tonsillectomy is a minor operation carried out on fit children, complications are apt to occur, and there can be no greater tragedy than the death of a healthy child as the result of a minor and perhaps unnecessary operation. Efficient anaesthesia is the main factor contributing to the safety of the patient and the successful removal of the tonsils. Not infrequently the responsibility for administering anaesthesia for this minor operation is delegated to some junior whose experience is limited to single shot "rag and bottle" anaesthesia, or alternatively, an otherwise competent anaesthetist may be prepared to accept the additional hazards imposed by a technique which does not permit complete control. In Britain, according to the Registrar General's figures (2) approximately 40 deaths per year are attributable to misadventures associated with this procedure.

Deaths caused by anaesthesia are invariably preventable, though extenuating circumstances may exist. The majority are caused by overdosage with a potent agent or hypoxia from deficient respiratory exchange. Respiratory obstruction is liable to occur in operations on the upper respiratory tract, and may be due to blood, packs, laryngeal spasm or simple depression of the tongue by retractors. Asphyxia not only endangers the child's life, but if present to even a minor degree will cause an increase in bleeding.

Postoperative pulmonary complications are usually the result of the inhalation of blood or infected material during or immediately after surgery, and prior to the return of the protective reflexes. Steele and Anderson (3) recovered blood from the bronchi of 125 out of 129 patients who were bronchoscoped immediately after tonsillectomy under general anaesthesia and without endotracheal intubation. Waldapfel (4) demonstrated radiologically that fever following tonsillectomy was usually associated with lung infiltrations of various sizes, and that the temperature returned to normal after resolution of these foci. Broncho-pneumonia, atelectasis and lung abscess are the major complications which have been reported following this operation.

Surgical complications and even operative technique are influenced by the conditions made available by the anaesthesia employed. Failure to provide good

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operating conditions for as long as is required will place the surgeon at a disadvantage, make the control of haemorrhage more difficult and lead to incomplete removal of the tonsils. Hyde (5) found residual tags in 68 per cent of 1,000 unselected cases, and this is a grave reflection on the standards of surgery and anaesthesia, either individually or in combination.

Guillotine enucleation, with or without the use of a snare for the removal of the lingual tag, may be successfully performed by a fast and competent surgeon in the short time made available by single shot anaesthesia. The margin for error is narrow, and excessive bleeding, difficulty in removing a scarred and fibrous tonsil or less expert surgery may necessitate longer anaesthesia for the successful completion of the operation. A screaming, coughing, struggling child whose airway may be obstructed by blood has never been an inspiring sight, and thus an effort was made to provide longer and more controllable anaesthesia by oro- or naso-pharyngeal insufflation techniques, posture and suction being employed to keep the airway clear of blood. The increased operating time provided by such methods permitted complete removal of the tonsils by dissection or any other method, but difficulties in maintaining the airway, ventilation and stable anaesthesia were still encountered. Since children are particularly susceptible to the untoward effects of hypoxia and haemorrhage, more adequate control is undoubtedly desirable.

A well-conducted anaesthetic should provide the patient with safety, comfort and minimal sequelae, the surgeon with the optimum operating conditions for as long as he requires, and the anaesthetist with the peace of mind associated with complete control of the situation. The agent and technique selected should therefore aim to provide a pleasant, smooth and rapid induction, stable maintenance, readily controllable depth of anaesthesia, minimal pharmacological upset, adequate oxygenation, and quick recovery of reflexes and consciousness. The airway and respiratory exchange should be under complete control, and aspiration of blood and infected material prevented. The jaw and throat should be relaxed and the optimum surgical exposure and conditions made available without the risk of respiratory obstruction or any other complication.

Endotracheal anaesthesia is therefore essential, and this has already been advocated in 1951 by Slater and Stephen (6) and again in 1953 by Pender and Hallberg (7). Those opposed to intubation claim that it prolongs induction time, requires deeper anaesthesia, may be difficult and traumatic, can lead to reflex vagal inhibition of the heart and that once the tube is in place not only does it get in the way of the surgeon, but may easily become displaced or blocked.

The technique successfully employed in a large personal series of cases, and about to be described in detail, will permit induction and intubation within sixty seconds, complete control of anaesthesia for as long as may be required, and recovery of consciousness within one to two minutes of the conclusion of the operation. Surgical exposure is improved and apart from one freak accident involving the cutting of an endotracheal tube by a guillotine, no other difficulties were experienced.

Repeated electro-cardiograms have failed to reveal any significant abnormalities during intubation or extubation, and this was no doubt due to the prevention of hypoxia, hypercarbia and undesirable "bucking" on the tube. Reflex vagal

inhibition of the heart as a result of irritation of the larynx under light anaesthesia should not, and probably does not, occur provided full oxygen saturation is maintained. Laryngeal stimulation by instruments, suction and packs during the surgical procedure is as great if not greater than that caused by an endotracheal tube, and if intubation is not employed this stimulus may be applied at less desirable levels of anaesthesia and oxygenation. It is therefore apparent that there can be no legitimate objection to endotracheal anaesthesia for tonsillectomy.

PREPARATION AND PREMEDICATION

The children are admitted to hospital the day prior to surgery in order that the necessary preoperative assessment and preparation may be carried out. Frank infection is excluded or treated with antibiotics, the haemoglobin, bleeding and clotting times being estimated in selected patients. However, the amount of bleeding which may occur during or after surgery is more frequently influenced by the pathological state of the tonsils, the vascular supply, the mode of enucleation, and the development of postoperative clot.

TABLE I
PRE-ANAESTHETIC MEDICATION FOR INFANTS AND CHILDREN

Age	Pantopon ^a		Hyoscine ^a
Up to 6 months	nil		Gr. 1/900
6 mo - 1 yr.	Gr 1/36	plus	Gr. 1/900
1- 2 yr.	Gr. 1/30	plus	Gr. 1/600
2- 4 yr.	Gr. 1/24	plus	Gr 1/600
4- 8 yr.	Gr. 1/15	plus	Gr. 1/450
8-12 yr.	Gr. 1/12	plus	Gr. 1/450
12-16 yr.	Gr 1/9	plus	Gr. 1/300

^aTo be given hypodermically 45-60 minutes pre-operatively.

Premedication by the subcutaneous injection of Pantopon and hyoscine in minimal dosages according to age (8) has been found sufficient to obtain the desired effect of mild sedation, amnesia, drying of secretions and reduction of reflex irritability, and without the disadvantage of undue depression. Although hyoscine may be preferred for its amnesic cortical depressant, anti-emetic and more potent anti-secretory effects, one of the authors (M. W. B.) has obtained satisfactory results with atropine in the same dosage.

Heavy premedication and even basal narcosis have been advocated as a means of preventing the psychic trauma occasioned by the barbaric form of anaesthesia so frequently employed. In view of the short duration of the operation and the need for early return of the protective reflexes, the unreliable but prolonged effect of heavy sedation is undesirable and may be dangerous. For this reason the oral or rectal administration of the medium, short or ultra-short acting barbiturates has little place in the management of the routine case. It is, however, possible that extremely nervous or hysterical children might benefit from heavy sedation, but as yet no such cases have been encountered in this series.

In recent years, and without the benefit of premedication, children have been subjected to an increasing number of needles for inoculation, antibiotic therapy.

laboratory investigation, etc., and as yet no adverse psychological effects, such as neurosis or night terrors have been reported. It therefore appears reasonable to assume that efficient venepuncture for the purpose of inducing anaesthesia with Thiopentone would be as effective in removing the fear of anaesthesia from children as it has been for adults. Parents whose children have been exposed to both inhalation and intravenous methods of induction have, by their special requests for the latter method, lent support to this assumption and many have volunteered the information that nightmares did not follow this method of anaesthesia.

INDUCTION

Efficient venepuncture is essential to the success of this technique, and new "23" needles and glass nozzled syringes are used. Since most surgeons work from the right, the left arm is secured to an arm board, before or after induction. Veins of the anterior surface of the wrist or back of the hand are preferred in infants and small children since sudden movement is more easily controlled. Wherever possible the medial aspect of the antecubital fossa is avoided. In most patients little difficulty has been experienced in finding a suitable vein, though on occasion a vein in the dorsum of the foot has had to be used. Selection of the site of injection, palpation of the vessel before or after application of the venous tourniquet (that is, at a pressure insufficient to occlude the radial pulse) combined with careful observation should preclude the possibility of inadvertent injection of Thiopentone in or near an artery.

In spite of the light premedication, few children raise any objection, and this is in part due to the friendly distraction provided by the nurses. Occasionally a small child may be reluctant to lie on the table, and if this is the case he is induced in a sitting position, or more rarely still, in the arms of a nurse whose maternal instinct will not allow her to surrender a forlorn infant. A tearful induction is therefore the exception rather than the rule.

The routine induction dose of Thiopentone is 25 mg. (1 ml. of 2½ per cent) per 10 lb. of body weight, and this may be increased or decreased 25 per cent depending on the speed of the surgeon, the age and build of the child, and the effect of the premedication. For an average operating time of 5 to 15 minutes the routine dose has proved satisfactory and is administered as quickly as possible. The Thiopentone syringe is then changed for one containing 2-5 ml. of succinylcholine (depending on the size of the child, and the anticipated duration of the operation) and the appropriate dose of 5 mg. (½ ml. Scoline) per 10 lb. of body weight is rapidly injected. Since the intermittent injection of succinylcholine is an integral part of the technique, the syringe is strapped in place with adhesive tape, a small strip of which is used to hold the plunger and prevent aspiration of blood which might block the needle.

The unconscious and apnoeic child is hyperventilated with oxygen for 15 to 20 seconds prior to oral insertion of a suitable endotracheal tube under direct vision. Upper respiratory obstruction interfering with oxygen inflation may be relieved by insertion of an oro-pharyngeal airway, but in spite of the fact that many of the smaller children had tonsils meeting in the mid-line, this airway

was seldom required. Continuous oximeter readings indicated that this hyperventilation with oxygen maintained the oxygen saturation in excess of 95 per cent for two or more minutes of complete apnoea. The complete relaxation and the adequate time available contributed to the ease with which atraumatic intubation could be carried out, and thus provided excellent conditions for the residents to gain practical experience in intubation.

INTUBATION

The basic equipment, as illustrated in Figure 1, is prepared prior to induction.

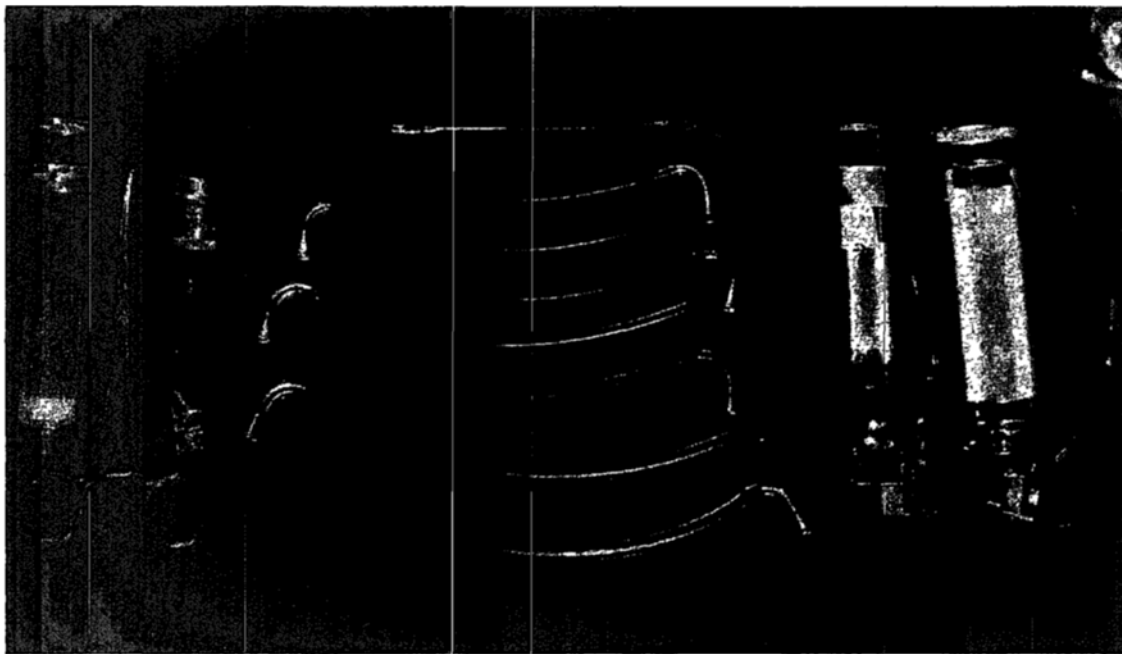


FIGURE 1 Basic equipment for intubation of children

A selection of McIntosh blades may be an advantage, but the medium adult blade has been found to give good exposure in almost all children over 30 pounds in weight, the No. 1 Miller blade being preferred for smaller children and infants.

The endotracheal tubes used may be rubber, portex or of other plastic material, and a complete selection of sizes must be available. Irrespective of composition these tubes should maintain their curve for ease of insertion, be firm enough to prevent obstruction by minor degrees of external pressure or kinking, and yet not too firm or the desired leak-proof fit for inflationary pressure of 10-15 mm. of mercury might not be obtained without undue pressure thus predisposing to postoperative irritation and oedema of the cricoid region in infants or the larynx in children.

The selection of the correct size of tube is important, since attempts to pass too large a tube will produce local damage leading to postoperative coughing, hoarseness and stridor, whereas too small a tube will permit aspiration of blood. If the tube used allows an appreciable leak of anaesthetic gases at inflationary pressures of less than 10 mm mercury, it should be changed for the next larger

size. Although maintenance of a positive pressure of 3-4 mm of mercury during both inspiratory and expiratory phases of the respiratory cycle will prevent the aspiration of blood—this has been confirmed by postoperative endotracheal suction via the endotracheal tube—there is troublesome “bubbling” in the presence of even a little blood in the throat, and the raised intrapulmonary pressure will raise venous pressure and may therefore increase bleeding.

The selection of the tube to be used is based on age, weight and build of the child, and confirmed by examination of the larynx prior to intubation. A good exposure of the larynx is required, and if there is any resistance to the insertion of the tube a smaller one is used. With increasing experience, the initial choice should almost invariably be correct and the trial and error method should not be necessary. The sizes of the oral rubber Magill tubes used in 1,000 consecutive cases have been classified according to the ages and weights of the children, (Table II). It should be noted that the rubber and Portex Magill tubes have a different system of numbering—for example, the rubber size 0 is larger than the Portex size 1.

TABLE II

Weight (lb)	Tube size	Age in years											
		Under 1	1	2	3	4	5	6	7	8	9	10-15	
Under 20	0	4	5 2										
21-25	0		4	3									
	1		11	13	1								
26-30	1	1	10	19	13	2							
	2		3	19	21	4	1						
31-35	1			8	7	4							
	2		1	33	69	26	9						
	3			1	4	7	2						
36-40	2			6	26	29	14	4	1				
	3			1	6	23	38	10	1				
	4				1	4	5	3	2				
41-45	3				4	14	39	22	2				
	4					3	15	14	6	1			
	5				1	3	3	12	4	2	1		
46-50	4					5	5	20	11	3	1		
	5						2	9	10	3	1		
51-55	4				2	2	4	13	9	2		1	
	5						3	10	16	8	3	1	
	4-c							4	2	2		1	
56-60	4						2	3	6	7	3		
	5						2	1	9	3	4	3	
	4-c							3	9	9	3	2	
60-70	4						1	1	1		1	2	
	5								4	2	5	1	
	4-c								2	4	7	11	7
Over 75	4 & 5 & 6-c							1		3	6	95	

The tube should preferably extend to the middle third of the trachea, and in this series a standard length for each size of tube has proved satisfactory. Too short a tube may be dislodged during the operation and too long a tube will reach the more sensitive lower trachea and carinal region and predispose to coughing prior to the removal of the tube, at the conclusion of the operation. With

the tip of the tube held at the entrance to the larynx an estimate of the optimum distance for insertion can be made in relation to the length of the tube remaining outside the mouth.

The acutely curved Magill nasal endotracheal adapters more closely approximate to the sharper angle created by the mouth gag, thus permitting the endotracheal connector to lie in closer apposition to the face and reducing the danger of kinking the smaller endotracheal tubes.

The tubes, which have been washed with soap and water but not sterilized, are lubricated with a sterile non-anaesthetic, water-soluble jelly since the increased risk of postoperative aspiration outweighs any advantages associated with the use of an anaesthetic lubricant. During insertion contact with any infected material from the nose and throat is avoided, and in this series there were no postoperative respiratory complications.

Following induction and intubation the mouth gag is inserted and the tube with Magill adapter attached is led through the gag prior to attachment to the rubber end of the endotracheal connector of a partial rebreathing or circle circuit. The tube is then fixed on the side of the mouth apposite to that from which the first tonsil is to be removed. This whole procedure can be carried out in less than forty seconds, but sixty to ninety seconds is the more usual unhurried induction time

MAINTENANCE AND MANAGEMENT

Maintenance is with a nitrous oxide-oxygen (25-50 per cent) mixture, adequate ventilation being assured by controlled or assisted respiration via any type of anaesthetic circuit. Complete control of palatal reflexes, respiration and movement is obtained by the intermittent administration of succinylcholine in dosage of 25-50 per cent of that used for induction—the amount given depending on the length of the original apnoea and the anticipated duration of the operation

Hyperventilation in a circle circuit with absorption will lower the blood carbon dioxide thus prolonging apnoea of the relaxant and potentiating anaesthesia by the analgesic effect of the reduced cerebral circulation, but the increased resistance of the circuit may, in smaller children, increase venous bleeding, though to a lesser extent than with even minor degrees of asphyxia. The nitrous oxide-oxygen mixture may be supplemented with 10 per cent cyclopropane if desired, but this is by no means necessary unless perhaps on the very rare occasions when the succinylcholine syringe becomes dislodged and cannot easily be replaced. A low resistance partial rebreathing circuit permits the addition of Trilene, analgesic concentrations of which will permit spontaneous respiration without breath-holding or coughing, and provide a short period of postoperative analgesia, thus reducing restlessness. Fluothane has also been used, but no particular advantages related to reduction in bleeding or tolerance of movement of the endotracheal tube under light anaesthesia have been observed.

Management during operation depends to some extent on the individual surgical technique. After guillotine enucleation the anaesthetist may, by external pressure on the neck, assist the surgeon in grasping the lingual tag for removal by a snare. When the first tonsil has been removed, either by guillotine or dissection, and the surgeon is ready to attack the remaining tonsil, the pressure on

the tongue depressor should be released to permit the tube to be moved to the other side of the mouth. If spontaneous respiration has returned, it is advisable to administer a further small dose of succinylcholine lest coughing be associated with movement of the tube.

Even in an infant the presence of an oro-endotracheal tube does not inconvenience the surgeon by encroaching on the operative field; on the contrary, the surgical exposure is improved because the tongue can be freely retracted without fear of obstructing the airway. Early in this series approximately 400 consecutive patients were intubated by the nasal route under direct vision, Magill's angled forceps being used to direct the tube through the larynx, thus avoiding trauma to the cords or cricoid region. The advantages related to secure fixation, absence of movement of the tube and doubtful improvement of surgical exposure were outweighed by the disadvantages of having to remove the tube prior to the return of consciousness so that the adenoidectomy could be carried out. Adenoidal obstruction to the passage of the tube could be overcome, but the danger of introducing infected material to the trachea existed, even though the end of the tube was cleaned by swab or suction prior to insertion into the larynx.

When both tonsils have been removed and bleeding controlled, the table is placed in a five to ten degree Trendelenburg position and adenoidectomy carried out. If the dosage of succinylcholine has been properly estimated, spontaneous respiration should be returning and when 100 per cent oxygen is administered the child will recover consciousness within one to two minutes. During this time adenoidal bleeding is arrested and a final examination and aspiration of the throat carried out. The succinylcholine syringe is removed and pressure applied to prevent formation of a haematoma. Provided the tube is not moved, most children will recover consciousness without coughing and extubation is then carried out either before or immediately after turning to the semi-prone position. It is preferable to remove the tube at the peak of inspiration so that an expiration cough or cry will be the first reaction.

Coughing or laryngeal spasm may be associated with pre-existing respiratory infection, irritation of the larynx or trachea by trauma or blood, the existence of hypoxia, or by extubation at a certain stage of lightening anaesthesia. Oxygen saturation prior to removal of the tube will prevent hypoxic perpetuation of minor degrees of breath-holding or spasm, and proper management should prevent this complication. Should spasm occur, the response to Trendelenburg, suction and oxygen inflation by mask is usually immediate, though re-intubation was carried out in two cases where there was bleeding.

RECOVERY

The conscious or semi-conscious child is removed from the operating room in the semi-prone position with a pillow under the chest. Such patients are kept in a well-equipped recovery room for 15-20 minutes to ensure that there is no further bleeding, and if left undisturbed most children will rest quietly. Swallowing of blood is discouraged since not only does this predispose to postoperative nausea and vomiting, but may hide continued bleeding. Repeated recordings of the pulse and examination of the throat will reduce this hazard.

REVIEW OF CASES

During the last four years this technique has been used on 3,262 patients between the ages of 1 and 15 years, the number being distributed as follows:

Age in years	0-1	1	2	3	4	5	6	7	8	9	10-15
No. of cases	15	123	350	467	447	462	430	287	190	121	370

Difficulties and complications have been remarkably few in number.

Induction

Comparative peace and quiet has replaced the anguished screams which used to emanate from the ENT theatres on tonsil mornings. Only two children were subjected to unsuccessful attempts at venepuncture, and in four, venepuncture was not attempted because the veins were poor (2 cases) or because the inhalation method was requested (2 cases). In the latter two cases, the children were induced with a nitrous oxide-cyclopropane or nitrous oxide-trichlorethylene mixture, after which succinylcholine was given to speed up intubation and permit control of palatal reflexes under a lighter plane of anaesthesia. With increasing experience induction difficulties are rarely experienced, though on occasion a vein in the dorsum of the foot was the only one to be found.

Intubation

Unhurried atraumatic intubation was made easy by the conditions provided. Obstruction to the tube by kinking or compression by tongue depressor or guillotine is easily diagnosed by the "feel of the bag" and just as easily remedied—though it may be permitted to exist for thirty seconds or so for the convenience of the surgeon. Right endobronchial intubation did not occur, but could easily be remedied by slight withdrawal of the tube. Accidental displacement of the tube occurred in one case during adenoidectomy but did not require replacement. On one occasion a tube was cut by a guillotine, and the distal portion, which slipped into the trachea, required immediate bronchoscopic removal; subsequent progress was uneventful. As mentioned above, minor degrees of laryngeal spasm occurred infrequently and were due chiefly to impatient removal of the tube. In two cases re-intubation was required by the development of cyanosis in association with a recurrence of bleeding, which made inflation by mask unwise. No postoperative respiratory complications associated with intubation or aspiration were observed.

Anaesthesia

Delayed recovery of spontaneous respiration is usually due to too recent or too large a dose of Scoline, and artificial ventilation for a few minutes post-operatively is all that is required. However, a genuine sensitivity to the induction dose did occur in one 3-year-old girl, and 1½ hours artificial ventilation with oxygen preceded recovery. Her little brother, aged 2, was apnoeic for 20 minutes following ½ the normal dose of succinylcholine. Both children had a low pseudocholinesterase level as a result of the fumigation of a basement with an anticholinesterase insecticide. One morning four consecutive patients, although breathing well, failed to wake up within a few minutes of the conclusion of the

operation. Investigation showed that inadvertent overdosage of Pentothal had taken place as a result of failure to mix one of the bulk solutions properly. Uneventful recovery of all four patients within periods of $\frac{1}{2}$ - $1\frac{1}{2}$ hours took place. No other anaesthetic difficulties were encountered during or after operation.

Surgical Complications

Bleeding during operation was not increased, and the ideal conditions provided for the arrest of haemorrhage reduced the incidence of immediate post-operative bleeding. The unlimited time available permitted careful removal of tonsils by expert and tyro alike.

SUMMARY AND CONCLUSIONS

The children undergoing, and the surgeons performing, tonsillectomy have for too long been denied the safety, comfort and operating conditions made possible by modern anaesthesia. Although this is a minor operation complications are apt to occur, and the cause and prevention of these are discussed. A technique which has proved safe, efficient and free from complications in a personal series of 3,262 cases over the last four years will permit induction and intubation within 60-90 seconds, complete control of anaesthesia for as long as may be required, and recovery of consciousness within 1-2 minutes of the end of the operation.

This technique is based on light premedication, intravenous induction with Thiopentone (25 mg per 10 lb of body weight) and succinylcholine (5 mg. per 10 lb. of body weight) and hyperventilation with oxygen prior to oral intubation. Maintenance is by artificial ventilation with nitrous oxide-oxygen, with or without minimal trichlorethylene, the intermittent administration of succinylcholine ($\frac{1}{4}$ - $\frac{1}{2}$ induction dose) being used to potentiate anaesthesia, control respiration and provide a quiet, relaxed throat. The endotracheal tube is kept at the side opposite to that on which the surgeon is working, and extubation is carried out in a Trendelenburg or semi-prone position on recovery of consciousness at the conclusion of the operation.

The surgeons appreciate the more rapid induction, better operating conditions and reduction in operative and postoperative complications, and it is felt that the advantages of endotracheal intubation are so apparent that reluctance to intubate can only be caused by inadequate equipment or poor technique. This selection of agents and technique, with or without minor variations, has been found of value in a variety of operations on infants and children.

RÉSUMÉ

Il y a déjà trop longtemps qu'on prive de la sécurité, du confort et des conditions opératoires rendues possibles par l'anesthésie moderne et les enfants qui subissent l'amygdalectomie et les chirurgiens qui pratiquent cette opération. En dépit du fait que cette opération est mineure, il est susceptible de survenir des complications, puis nous en discutons les causes et la prévention. Au cours des

quatre dernières années, dans une série de 3,262 cas, nous avons employé une technique qui s'est avérée de toute sécurité, efficace et exempte de toute complication: elle nous permet de faire l'induction et de pratiquer l'intubation en deçà de 60 à 90 secondes, d'avoir un contrôle complet de l'anesthésie aussi longtemps qu'on l'exige et d'avoir un retour à la conscience en deçà de 1 à 2 minutes après la fin de l'opération.

Cette technique consiste en une prémédication légère, une induction au Thiopentone par voie intraveineuse (25 mg par 10 livres de poids) et de la succinylcholine (5 mg. par 10 livres de poids), puis une hyperventilation avec de l'oxygène avant l'intubation orale. On maintient l'anesthésie par la respiration artificielle avec du protoxyde-oxygène avec ou sans des traces de trilène, puis on répète des doses intermittentes de succinylcholine ($\frac{1}{4}$ à $\frac{1}{2}$ la dose de l'induction) pour potentialiser l'anesthésie, contrôler la respiration et procurer une gorge calme et relâchée. Nous plaçons le tube endotrachéal du côté opposé à celui où le chirurgien travaille et nous pratiquons l'extubation en position de Trendelenbourg ou en position semi-ventrale au retour de la conscience à la fin de l'opération.

Les chirurgiens apprécient l'induction rapide, des conditions opératoires améliorées et la diminution des complications per et post-opératoires et il semble que les avantages de l'intubation endotrachéale sont tellement transcendants que seulement une instrumentation inadéquate ou une mauvaise technique pourraient justifier de ne pas intuber. Ce choix des agents et de la technique, avec ou sans modifications mineures, s'est avéré précieux dans une variété d'opérations chez les bébés et les enfants.

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