

présente des milieux troubles, un œdème rétinien ainsi que des hémorragies et des détachements bilatéraux inférieurs. Une surdité souvent bilatérale mais transitoire avec ou sans bourdonnement peut inquiéter le malade. Le tableau clinique ressemble alors à celui d'une lésion intracrânienne progressive. La convalescence s'amorce à la troisième période pendant laquelle la majorité des lésions disparaissent lentement au cours des mois. Moins de 30% des malades, cependant, recouvrent une vision satisfaisante à cause des complications oculaires (glaucome, cataracte, atrophie optique, contraction du globe oculaire etc.). C'est pendant cette période que l'on voit s'installer la poliose, le vitiligo et l'alopécie. Les faits cliniques de cinq cas sont donnés en guise d'illustration.

Les auteurs s'engagent dans une discussion des deux théories sur l'étiologie de cette affection, à savoir: une infection à virus ou une allergie aux pigments uvéaux. Le gros des preuves semble indiquer une infection virale.

Certaines humeurs injectées au lapin reproduisent la maladie d'assez près; on peut également transmettre d'un animal à l'autre l'affection qui en résulte. On aurait même isolé un virus d'un cas à ses débuts. Il faut se rappeler cependant que les résultats n'ont pas toujours pu être reproduits et sont donc équivoques. Cette théorie d'ailleurs est impuissante à expliquer les manifestations ectodermiques de la troisième période. Le syndrome uvéo-encéphalique a plus d'un trait en commun avec l'ophtalmie sympathique si bien que certains auteurs refusent de voir deux entités nosologiques différentes et prétendent que la seule différence réside dans le mode de pénétration du virus (par blessure dans l'ophtalmie sympathique).

Les bases de la théorie allergique sont très mal établies. La maladie semble s'attaquer plus fréquemment aux individus de races pigmentées qu'aux blancs. Il n'existe aucun traitement spécifique bien que les cortico-stéroïdes aient donné des résultats appréciables.

THE HAZARDS AND PRINCIPLES OF ANÆSTHESIA FOR TONSILLECTOMY AND ADENOIDECTOMY IN CHILDREN*

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TONSILS IN OR OUT? This is a problem that has troubled the medical profession for many years, and it seems that the question is still unanswered. In England in 1938 a Medical Research Council report regarded the operation as "a prophylactic ritual carried out for no particular reason with no particular result".⁷ The truth, of course, is that some benefit does accrue from the removal of some tonsils and adenoids. The possibility that some tonsils and adenoids might just as well be left where they are is purposely stressed not because anæsthetists are often asked to decide this point but, if no great harm is likely to befall a child who retains these items, it is a major catastrophe if some harm does befall him in the process of losing them.

HISTORY

Hindu surgeons were attacking the tonsils as long ago as 1000 B.C.¹ and Celsus, in A.D. 30, would tear them out with a fingernail.² However, the real benefactor of the modern otolaryngologists was a certain Dr. Bosworth, who around 1884 expounded the view that all faucial tonsils were abnormal.³ Since this time some form of guillotine operation held the field almost until the present day, though Waugh described his technique of blunt dissection in 1909,⁴ but taking three minutes to complete, this took at least six times as long as the guillotine operation.

For a long time the operation was performed without anæsthesia and this surprisingly enough was being advocated as recently as 1935.⁵ However, though Warren remarked on the use of ether in 1848,⁶ general anæsthesia was probably not much in vogue until the 1890s.² Two of the favourite techniques were the single-dose method with ethyl chloride or nitrous oxide for the guillotine procedure and ether insufflation of the oropharynx for dissections. Both methods are still widely used.

PRESENT POSITION

Today the operation still retains much of its popularity, and though the guillotine method is still employed it is gradually giving way to more careful methods of dissection; this paper is therefore concerned mainly with anæsthesia for the latter operation.

In 1954, at a cost to Great Britain of eight and a half million dollars, close upon a quarter of a million children underwent tonsillectomy and/or adenoidectomy,⁷ and in Ontario in 1951, 8% of all hospital discharges — medical and surgical — were labelled "hypertrophy of tonsils and adenoids".⁸ In the United States the operation is reported as comprising one in four of all surgical operations,⁹ and at the Montreal Children's Hospital it comprises around 28% of all operations on children.¹⁰

With this long history and high incidence, it is surprising that Collins and Granatelli were able to write in 1956, "The most neglected of anæsthetic procedures is that for tonsillectomy",¹¹ and in spite of the number of articles which have recently appeared on this subject, their remarks still contain more than a grain of truth.

HAZARDS

In 1955 in Canada, 27 children under 15 years of age died, and tonsillectomy and adenoidectomy appeared on the death certificate.¹² In a review from a town in the United States of 20,000

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operations performed over 30 years, there was an incidence of one death per 2200 cases.¹³

The causes of mortality and morbidity are not well documented, but some facts are available. Of a series of 750 deaths associated with anæsthesia investigated by a committee in England, ten were also associated with tonsillectomy and/or adenoidectomy.¹⁴ Five of these were associated with anæsthesia for postoperative hæmorrhage. Of the other five, four probably died as a result of blood in the bronchial tree. By merely talking to 26 anæsthetists (half of whom are still in training) here in Montreal, it has been possible to obtain information on 12 deaths associated with this operation, though these were not by any means all firsthand experiences. Of these, five died from postoperative hæmorrhage, and five appeared to have died from cardiac arrest, with or without anoxia and/or anæsthetic overdosage. The eleventh inhaled a clot and asphyxiated and the twelfth was accidentally insufflated with liquid ether. In collecting these few cases, it was impossible not to note the number of "near misses" that occurred.

Of postoperative complications, Waldapfel¹⁵ states that hæmorrhage is the commonest and that lung complications follow this in frequency. Formerly, pulmonary abscess was frequently reported as a sequel to the operation, but it is almost unheard of now. However, Waldapfel states that small areas of atelectasis have been demonstrated postoperatively and are probably more common than we think and may account for a number of cases of postoperative fever. Finally psychological trauma, manifest by night terrors, bed-wetting and the like, has been quoted as a sequel to a stormy visit to hospital for the operation in question.¹⁶

MANAGEMENT OF THE ANÆSTHETIC

Preparation of the patient for operation starts even before he is admitted to hospital, and can be considered as psychological and pharmacological.

The psychological aspect engulfs all the problems associated with the admission of children to hospital, for often this particular admission may be their first encounter with hospitals and is also often the first separation of the child from its parents. Much has been written of the ways to reduce psychological trauma, but it would seem that there is little better than commonsense handling at this stage. Though no-one would desire the child to be thoroughly terrified, it is also of importance that children learn to cope with some of the less pleasant experiences in life, and it should not be forgotten that even young children are often able to understand a simple explanation of what is in store for them. It is probably equally important that the parents should receive a similar explanation, in order to dispel their anxiety, which is often very contagious to their children.

That these children should be admitted to hospital is less debated than formerly, but in some hospitals children for this procedure are still ambulatory, arriving a half to one hour before operation. This allows time neither for any physical assessment nor for the child to get used to his new environment. One is not certain that milk or the like has not been recently administered by a compassionate mother. There is no time for a preoperative visit by the anæsthetist, so that after being torn screaming from its mother's arms and dumped on the operating-room table, the child's first encounter with this individual is when he descends upon him in cap, mask and gown, brandishing an ethyl chloride spray in one hand and a Schimmelbusch mask in the other.

The aims of pharmacological preparation are little different for this operation than for any other procedure, whether it be in adult or child, viz. to lessen secretions and to allay fear and apprehension, thus augmenting the effect of psychological preparation.

The first aim is relatively easy to satisfy by the administration of atropine or hyoscine according to taste, though in addition to the advantage of its central depressant effect, the latter drug has recently been shown to be a better drying agent.¹⁷ The second aim is not so easy to satisfy, for adequate preoperative sedation often leads to depression during induction and maintenance and in the postoperative phases. Many agents have had their vogue, but usually the choice lies between no premedication other than atropine and the use of a barbiturate or an opiate. The first alternative seems inhumane, for even with the best of good intentions to put on a brave face, some children do break down at the last minute. With adequate dosage of a barbiturate such as pentobarbitone, the child can be sent to sleep in his ward, but this effect tends to be unpredictable, the drug has an unpleasant taste and anyway such dosage tends to make some children unduly depressed, both during induction and maintenance, and in the postoperative phase may cause either depression or undue restlessness. Rectal thiopentone¹⁸ is undoubtedly better in all respects, but children who have received this require very careful preoperative supervision. The objection that it is a gross assault upon the child would seem to be invalid, and there is one head nurse who obtained excellent results by merely pointing out that the medicine did not taste nasty given that way. Opiates are tolerated well by children in appropriate dosage, but there are some who consider Anderson's scale of doses¹⁹ to cause too much postoperative depression for use in tonsillectomy cases. For those who hold this view, Leigh and Belton's scale of doses²⁰ may be used one hour preoperatively. A small dose of pentobarbitone half an hour before this injection enhances preoperative sedation, and the inclusion of an analgesic appears to pay dividends in the postoperative phase. The

dose of pentobarbitone required is 16 mg. for children from one to three years, 30 mg. from four to seven years, and 60 mg. from eight to twelve years.²¹

Timing of the premedication is as important in this operation as it is in any other, and to be admitted into the anæsthetic room accompanied by a nurse he knows is added security for the child. The operation, if possible, is best scheduled for the morning, for a child may put up with missing his breakfast, but to be deprived of his lunch as well is often too much, especially if other children in the ward are enjoying theirs. Likewise, it is bad for morale for children awaiting operation to witness the recovery of those who have already been through the process.

Induction

Ideally this is a quiet and peaceful procedure and is achieved by a skilful intravenous injection^{24, 25} or a delicate wafting of nitrous oxide or cyclopropane before the child's nostrils. Both procedures are more successful if accompanied by a constant hypnotic discourse from the anæsthetist, absolute silence being observed by any onlookers, for an untimely word from these quarters will divert the child's attention and may cause several minutes' additional hard work. The only special problem to be borne in mind at this stage is the possibility of upper respiratory obstruction occurring, due to the enlarged tonsils and adenoids. It may also be mentioned that ethyl chloride does not appear to be the innocuous agent so many people believe it to be.²²

Maintenance

It is at this phase that the most controversial matter is reached. It is not intended to discuss the relative merits of various agents, for this is really a very minor matter. Almost any agent can be employed and the choice is really the choice of the administrator, his aim being to avoid overdosage and anoxia and to have his patient virtually awake with all the vital laryngeal and pharyngeal reflexes active at the end of the operation. In addition, perfect control of the airway must be achieved and it is over this point that controversy rages.

The established method has been to position the child's nasopharynx lower than the larynx and by some device or other to hold the tongue forward. Ether and oxygen or air are then insufflated into the airway. The modern trend, advocated for many years in some quarters²³ but stressed in recent articles, is to pass an endotracheal tube.^{24, 25}

To assess the merits of the two methods it would be as well to review the anæsthetic requirements of the stage. They are:

1. To maintain a clear airway—rule number one for all anæsthetics.²⁶ This is necessary to allow free access of oxygen and anæsthetic vapours to the alveoli and to allow egress of carbon dioxide.

Also it is necessary to have a clear route for the administration of oxygen in emergency.

2. To prevent access of blood and debris to the larynx, trachea and bronchi, in order to prevent asphyxia and postoperative lung complications.

3. To have sufficient control over the depth of anæsthesia, in order to avoid overdosage with the agent, to keep anæsthesia tranquil and to have the child virtually awake at the end of the operation.

It will be remembered that the particular hazards of this operation are: (a) hæmorrhage during and after the operation, of sufficient amount to cause death on occasion; and (b) inhalation of blood or debris, again on occasion sufficient in amount to cause death. Finally, Stephen²⁷ states that the greatest single cause of death in pædiatric anæsthesia is anoxic anoxia, and he points out how even a small obstruction is relatively severe in the small airway of the child.

How then does the insufflation method meet these requirements? It would not appear to meet any of them.

1. It does not maintain a clear airway, for the surgeon is working right in the centre of this, normally the anæsthetist's most jealously guarded territory. Laryngeal stridor often occurs or even gross coughing when the patient is light, and respirations are often shallow and feeble when the patient is deep. A minor obstruction due to a tiring assistant's allowing the neck to flex or the tongue to fall back, inevitably results in some degree of anoxia. Signs of this anoxia may not be very easy to detect if, as is often done, the surgeon insists on working in the dark. Finally, strain what oxygen is reaching the patient through a bloody gauze swab in the oropharynx, and it becomes but a very short step to cardiac arrest.

Collins and Granatelli¹¹ showed with some oximetric studies that, near the termination of three insufflation anæsthetics, oxygen saturation of the arterial blood was around 75-80%.

Lowenthal²⁸ has shown that pharyngeal secretions enter the larynx during deep anæsthesia, and several other workers have demonstrated a high incidence of bloody secretions in the trachea and bronchi after tonsillectomy and adenoidectomy.²⁹⁻³³ Small amounts of blood are probably harmless, but if small amounts can enter so can large amounts in the event of hæmorrhage getting out of control, and so also can infected debris.

3. By this method it is necessary to anæsthetize the patient fairly deeply in order that coughing may be eliminated. If this is not achieved, it is very difficult to deepen the anæsthetic during the course of the operation. It is also easy to produce apnoea by having the patient too deeply anæsthetized, especially at the beginning of the operation.

How, on the other hand, does endotracheal anæsthesia meet these requirements?

1. As far as is humanly possible under the circumstances, it maintains a clear airway and allows artificial ventilation to be performed at will.

2. By the choice of a snugly fitting tube it is possible to prevent access of blood in any quantity or debris into the trachea; should blood find its way in, it can be readily aspirated.

3. It has been shown that with endotracheal anæsthesia, anæsthesia can be maintained with lower blood concentrations of ether.³⁴ Over-dosage is therefore less liable to occur, and if it does there is a reservoir bag to indicate this in a dark operating room. Should coughing occur, there is a patent airway available to deepen anæsthesia. Other advantages are that with the use of a short-acting relaxant induction time is greatly shortened from the minimum of seven minutes required for the insufflation method, and also a modern technique of so-called "balanced anæsthesia" may be employed, if desired.

The objections to endotracheal anæsthesia are many. Some surgeons say that the tube gets in their way, but many other surgeons manage quite well by moving the tube from one side of the mouth to the other. An improvement on this method would seem to be the use of the modified Boyle-Davis gag described by Doughty.²⁴ This hides the endotracheal tube in the midline under the tongue spatula and also prevents any trauma or stimulation of the larynx, which may occur from movement of the tube during operation. Nasal intubation also has the advantage of not stimulating the larynx, but there is a real danger of damaging the adenoids, causing profuse bleeding when it is passed, and it is not possible to use as large a tube as by mouth. It is also claimed that trauma may occur to the larynx after intubation, but at least three separate series^{25, 35, 36} amounting to over 12,000 cases have been reported with no permanent laryngeal sequelæ. If Smith's³⁵ recommendations for avoiding mechanical trauma, chemical trauma, and bacterial contamination are followed, it seems likely that others could produce similar results. Stridor is not an uncommon complication, but in one series¹¹ it was nearly three times as frequent after the use of an insufflation technique. A further objection is that an endotracheal tube increases the airway resistance, and in fact the resistance is inversely proportional to the fifth power of its diameter.³⁷ At a flow rate of one litre per minute a No. 9 Magill tube increases the normal resistance of the upper respiratory tract seven times.³⁸ However, in practice no great harm seems to arise; should the anæsthetist feel strongly about the matter, he can always saddle himself with the extra burden by assisting respiration.

As mentioned earlier, it is not intended to discuss specific agents used for maintenance, but some mention must be made of the use of relaxants. These do not seem to be contraindicated, provided: (a) an endotracheal tube is used; (b)

the duration of action of the relaxant chosen suits the duration of the operation, so that full muscle power has returned at the end of the procedure; and (c) adequate ventilation is ensured. The latter requirement almost certainly entails assisting respiration, and it could be argued that raising the venous pressure by this means might cause increased oozing of the operation site.

Finally, it is often argued that the insufflation technique has stood the test of time, but one wonders whether this is true. Anæsthetic deaths are still too numerous for this elective operation, and it is difficult to escape the conclusion that insufflation methods no longer satisfy the high standards demanded of modern anæsthesia.

The Postoperative Phase

At the end of the operation it is desirable for the patient to have complete control of his airway, and it should therefore be the aim to have the child virtually awake at the end of the procedure. In this way, vital laryngeal and pharyngeal reflexes are present to protect against the hazards of this phase of the operation, namely aspiration of blood or obstruction of the airway by the tongue. This is undoubtedly the greatest safeguard we can offer the patient, but failing this he should be allowed to recover in the semi-prone position, without a pillow under the head. In this way blood drains out of the mouth instead of into the larynx, and the tongue falls away from the posterior pharyngeal wall.

Sedation in this stage is also a vexed question, but with light premedication and anæsthesia, may be necessary. If the child is well awake, it would seem that small doses of meperidine (Demerol) are innocuous and being analgesics are more effective than the traditional use of hypnotic. A careful pulse record must be kept during this stage in order that signs of postoperative hæmorrhage may be detected, for children often swallow the blood and a rising pulse is the first sign that all is not well.

Finally a short description of the operation is of note. It is that of a surgeon named Sharn, who, trying to popularize the operation in 1750, said, "It is neither dreadful in the doing, nor melancholy in the event."³⁹ We might do worse than appropriate these words and apply them to our anæsthetic method.

SUMMARY

The possibility that the operation of tonsillectomy and/or adenoidectomy in children may sometimes be unnecessary is stressed, in order that anæsthetists should appreciate the catastrophic nature of any death occurring as a result of the procedure.

A short résumé of the history of the operation is presented.

An attempt is made to give some idea of the frequency of the operation and of the incidence of death resulting from it. The main causes of morbidity and mortality are presented.

The management of the anæsthetic is discussed. The problems associated with premedication are considered and a critical evaluation of the cases for and against endotracheal intubation in this operation is presented, with the conclusion that insufflation methods no longer satisfy the high standards required of modern anæsthesia.

Brief mention is made of some of the postoperative problems.

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RÉSUMÉ

L'auteur insiste sur l'importance d'une indication chirurgicale réelle pour l'ablation des amygdales et des adénoïdes, étant donné la nature désastreuse de toute catastrophe encourue durant ou après l'opération.

Un bref historique de l'opération est inclus dans l'article, l'origine de l'intervention remontant à l'an 1,000 avant J. C. L'intervention est encore de nos jours très pratiquée, mais au Canada en 1955, vingt-sept morts chez les moins de quinze ans lui sont attribuables. Les principales causes de mort sont l'hémorragie, l'inhalation de sang et l'arrêt cardiaque en cours d'anesthésie. Cette dernière complication peut être la résultante d'une surdose d'agent anesthésique, de l'anoxie ou d'une action simultanée de ces deux facteurs. Des complications pulmonaires mineures sont possibles pendant la période post-opératoire.

La préparation préopératoire de l'enfant devrait être à la fois psychologique et pharmacologique. Sous ce dernier rapport il est considéré inhumain de ne pas user d'un sédatif dans la prémédication. Il est cependant important d'éviter une dépression trop grande de l'enfant.

Les problèmes relatifs au maintien de l'anesthésie, le pour et le contre de l'intubation sont discutés à fond, avec la conclusion que l'ancienne méthode d'anesthésie par insufflation n'atteint plus le haut standard requis par l'anesthésie moderne. Sans intubation endotrachéale, l'anesthésiologiste n'a un contrôle adéquat, ni de la perméabilité des voies respiratoires, ni de l'agent anesthésique. Un degré plus profond d'anesthésie est requis chez les patients non intubés, l'anoxie s'installe plus aisément et les débris ont plus facilement accès au larynx.

Plus de 1,200 cas sont rapportés, chez lesquels l'intubation a été employée sans aucun trouble permanent.

En terminant l'auteur insiste sur l'importance d'obtenir d'actifs réflexes laryngien et pharyngien à la fin de l'opération.

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THE ASSESSMENT OF THE CERVIX AT SURGICAL INDUCTION*

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SINCE 1952, when Gibson¹ reported upon a series of surgical inductions from Belfast, several publications have appeared in the British literature which reflect a renewed interest in the subject. It is generally accepted that the success of an induction is dependent upon the ripeness of the cervix, but two of the recent writers (Evans,² Parker³) raise doubts about the value of the traditional view. On the other hand, Cocks⁴ reported a series of 133

cases in which the initial condition of the cervix was carefully studied, and he concluded that by doing so "the clinician can learn much that will help him in the subsequent care of his cases".

The present investigation was planned in order to determine whether or not the condition of the cervix at surgical induction really influenced subsequent events; to do so, the method of classifying the cervix recommended by Cocks was employed. Six types of cervix are described, and these are explained by the accompanying diagrams and legends. Furthermore, it was considered that many other factors could influence the course of labour after induction, notably age, parity, gestation period, station of the presenting part, type of induction, character and amount of liquor, and the primary condition necessitating induction. Such additional data were collected to assist the final analysis.

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