Anaesthesia for Laryngoscopy and Microsurgery of the Larynx

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SUMMARY

This article describes a simple anaesthetic technique, requiring no sophisticated apparatus, to ensure satisfactory and adequate operating conditions for all types of laryngoscopy and laryngeal surgery, including microscopy. It employs nasopharyngeal insufflation of anaesthetic vapour combined with local analgesia of the larynx and intermittent doses of intravenous agents. The case reports of 36 patients who underwent microlaryngoscopy and/or microsurgery of the larynx are briefly reviewed.

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A wide variety of patients present for laryngoscopy and microsurgery of the larynx. They vary from the young and healthy patient with hoarseness as the only complaint, to the old and infirm with varying degrees of respiratory distress and obstruction. It soon becomes apparent that the old-established technique with thiopentone and suxamethonium is only suitable for the healthy patient who is to undergo a quick 'look and see' by a skilled laryngoscopist. The advent of the operating microscope and suspension laryngoscope demands new anaesthetic techniques.

The requirements for modern-day surgery of the larynx may be summarised briefly as follows: an unobstructed view of the larynx; well-relaxed unresponsive cords; a clear airway; enough time for the surgeon to work unhurriedly; a smooth and rapid recovery from anaesthesia; a non-explosive technique; and protection of the tracheobronchial tree from foreign material. It is most difficult for any one technique to satisfy all these requirements.

Until recently, methods of anaesthesia revolved around two basic techniques. Firstly, intubation with various narrow endotracheal tubes[1-3] and maintenance of anaesthesia with inhalation agents with or without the use of muscle relaxants, and secondly utilising topical analgesia of the larynx combined with neurolept analgesia. Gordon and Sellars[4] described a technique which they evolved by combining general and neurolept anaesthesia with spraying of the vocal cords and laryngeal inlet with 4% lignocaine.

Recent developments have centred around an extension of Sanders' injector technique,[5] using the Venturi principle to perform intermittent tracheal ventilation. Spoerel and Greenway[6] describe the use of a nasotracheal catheter as an intratracheal jet in 59 cases. Intermittent interruption of a jet flow with a Bird Mark II ventilator provides intermittent positive pressure ventilation. Anaesthesia is maintained with intravenous agents and muscle relaxants as required. Rajagopalan *et al.*[7] described 16 unselected patients on whom the Bird Mark II ventilator was used, and the injector cannula was inserted into one of two light channels of the suspension laryngoscope, which is carefully positioned with its proximal end lying just above the larynx. Intermittent doses of thiopentone and suxamethonium were used to maintain anaesthesia and relaxation. Another variation of the same principle is described by Carden and Crutchfield.[8] They anaesthetised 25 patients with a special tube placed 1 - 2 cm below the cords. Intermittent insufflation of O_2 at high pressures from an O_2 jet is used to ventilate. The cords are relaxed with a suxamethonium drip and anaesthesia is maintained with 3-ml increments of 1% methohexitone. They claim great safety for the patient and almost perfect operating conditions for the surgeon.

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MATERIAL AND METHODS

It occurred to me that the old, discarded and seldom thought-of technique of nasopharyngeal insufflation might be employed to provide satisfactory operating conditions. This could then be combined with local analgesia of the larynx. This basic technique, with certain minor modifications, was used at the Johannesburg General Hospital on 78 patients for laryngoscopy or laryngeal surgery, or both. Thirty-six of these patients underwent microlaryngoscopy and/or microsurgery of the larynx. The technique is described, with a brief review of the 36 patients.

Pre-operative Procedures

The patient is examined and assessed the day before surgery. The problem and surgical requirements are discussed with the surgeon. Particular attention is paid to the external nares and nasal passages to assess the suitability of passing a nasopharyngeal tube. An assessment is made at this stage whether an intravenous or inhalation induction is to be undertaken. If an inhalation induction is contemplated, then this is discussed with the patient to gain his confidence and co-operation.

Premedication

This is chosen to suit the patient and covers a wide range of drugs including droperidol (Inapsin), diazepam (Valium), promethazine (Phenergan) and hydroxyzine

(Aterax). The vast majority receive, in addition, 0,6 mg atropine intramuscularly 45 minutes pre-operatively.

Technique

On admission to the theatre an intravenous line is set up. Blood pressure and electrocardiograph are monitored. The degree of sedation is assessed, and if considered inadequate, droperidol is given in a dose of 2,5 - 5,0 mg intravenously. Five minutes are allowed to elapse to judge its effect. Nowadays fentanyl in a dose of 0,05 - 0,1 mg intravenously is given to most patients. This is followed by either an intravenous induction with a barbiturate or propanidid (Fabantol), or an inhalation induction with N_2O, O_2 and halothane.

In the total series anaesthetised, 54 patients received an intravenous induction (propanidid—26; thiopentone—19; methohexitone—9) and 24 received an inhalation induction. Anaesthesia was deepened with a face mask, N_2O, O_2 and halothane with or without methoxyflurane. Pure oxygen has occasionally been used. When the patient is sufficiently deeply anaesthetised the larynx, vocal cords and subglottic area are sprayed with a 10% topical lignocaine aerosol spray. (Each metered dose delivers 10 mg lignocaine — this prevents overdosage and increases its safety margin. Five or 6 sprays are delivered.) Anaesthesia is deepened with the face mask, and a few minutes later the cords are resprayed 2 or 3 times to reinforce the local analgesia. When an adequate and even level of anaesthesia is attained a well-lubricated nasopharyngeal tube is passed, the distal end of which should project 2 - 3 cm beyond the uvula. If used with halothane, the methoxyflurane is stopped at this stage and surgery is begun. Anaesthesia is maintained with a fresh gas flow of 10 litres per minute (5 litres N_2O and 5 litres O_2) and halothane. The gases are insufflated into the pharynx via the nasopharyngeal tube. The patient's chest and abdomen are carefully observed to assess respiration and depth of anaesthesia. With increasing experience it becomes easy to anticipate lightening anaesthesia by watching the abdominal muscles which begin to strain on expiration. Anaesthesia may be rapidly deepened by giving small increments of fentanyl and/or propanidid intravenously. The more recent trend has been towards intermittent doses of propanidid and smaller doses of fentanyl.

The cords should be resprayed every 15 - 20 minutes to reinforce the local analgesia, which usually wears off after this period. If there is a need for bronchoscopy, 2 ml 2% lignocaine is injected into the trachea through the cricothyroid membrane, or the local analgesic solution is sprayed into the trachea through the laryngeal aditus with a special long nozzle.

Review of 36 Patients

There were 21 males and 15 females. Their ages ranged from 19 to 75 years with a mean of 52 years.

Premedication (Table I): A total of 32 patients received atropine 0,6 mg intramuscularly 45 minutes pre-operatively.

Induction: Fifteen patients received a further dose of droperidol intravenously on admission to the theatre (5 received 2,5 mg and 10 received 5,0 mg). Twenty-two patients received fentanyl (Table II) and of these 10 received only an initial dose of 0,05 - 0,1 mg without further increments. Twenty-five patients were given an intravenous induction (all with propanidid) and 11 underwent an inhalation induction with N_2O, O_2 and halothane. In patients receiving an intravenous induction, inhalation with N_2O, O_2 and halothane is commenced simultaneously.

Maintenance: We used 5 litres N_2O plus 5 litres O_2 with varying concentrations of halothane (usually in the region of 2%). Nineteen patients received incremental doses of propanidid (50 - 100 mg) during surgery. The maximum total dose administered to any one patient was 1,9 g. Twelve patients received incremental doses of fentanyl (Table II).

TABLE I. DRUGS USED FOR PREMEDICATION

Drug	Dose (mg)	No. of patients
Droperidol	2,5 - 5,0	15
Diazepam	5 - 10	8
Promethazine	25	4
Promethazine and droperidol	25 + 2,5	3
Promethazine and diazepam	25 + 5	2
Hydroxyzine	50 - 100	2
No premedication		2
	Total	36

TABLE II. FENTANYL DOSAGES EMPLOYED

Dose (mg)	No. of patients
0,05	1
0,1	12
0,15	3
0,20	2
0,25	2
0,30	2
Total	22

Operations: Seven patients underwent bronchoscopy at the same time. One patient underwent tonsillectomy after removal of a Singer's node. Four patients had oesophagoscopy performed and they were intubated orotracheally at the end of the laryngeal procedure (Table III).

TABLE III. SURGICAL PROCEDURES

Type of procedure	No. of patients
Microlaryngoscopy only	10
Microlaryngoscopy and biopsy	14
Polyp of vocal fold	7
Stripping of vocal folds	2
Singer's node	1
Resection of laryngeal web	1
Cyst of vocal fold	1
Total	36

Duration of anaesthesia: The minimum duration was 25 minutes and the maximum 105 minutes, with a mean of 54 minutes.

Recovery: This was smooth and rapid after cessation of anaesthesia.

Complications: There was no mortality. An occasional complication that arises is respiratory obstruction due to the epiglottis falling back and occluding the airway. This can easily be corrected by the surgeon elevating the epiglottis with his laryngoscope. There were no signs of toxicity due to overdosage of local anaesthetic.

DISCUSSION

Although many theoretical disadvantages of this technique immediately come to mind, in practice it has proved most useful and satisfactory. The surgeons have been most satisfied with the operating conditions. They have a completely unobstructed view of the larynx and are able to work unhurriedly. They can take adequate care of blood and debris with the suction apparatus. Although no direct control of the airway is available, it was never necessary to intubate or assist ventilation. A wide assortment of endotracheal tubes is always kept at hand should it become necessary to intubate. An emergency tracheostomy set is always immediately available in theatre. It is important not to hurry the induction and establishment of adequate anaesthesia. Premature spraying of the cords may precipitate laryngeal spasm. Intubation of the nose must be as atraumatic as possible, as an epistaxis may negate the value of the technique.

Early in the series high concentrations of halothane and methoxyflurane were insufflated to maintain adequate anaesthesia, but lately more reliance is placed on intravenous agents, and lower concentrations of inhalation anaesthetics are employed. With the operating microscope in use, the surgeon is no longer exposed to halothane vapour from the pharynx. It is important for the anaesthetist to establish good rapport with the surgeon, in order that they appreciate each other's requirements and problems, and deal with them promptly should they arise.

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