

## Review Article

*Anesthesia for Peroral Endoscopy and Bronchography*

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THE CHOICE of anesthetic management for patients submitted to peroral endoscopy or bronchography continues to be a subject of controversy. Some of this controversy involves questions of personal preference not of vital medical significance, but some involves questions closely related to the safety of the patient. This review is an attempt to examine the current literature on the subject, draw some conclusions therefrom, and, finally, to temper these conclusions with the author's personal experience in both anesthesiology and otolaryngology.

It is a fact that mortality associated with these "minor" procedures is unreasonably high. Various surveys of deaths associated with anesthesia and surgical operation indicate that a disproportionate number occur in patients undergoing endoscopy or bronchography.<sup>1, 24, 41, 50</sup> A survey in Baltimore covering four years in the mid-fifties uncovered a mortality of 1 in 999 patients. Of these deaths approximately 10 per cent were associated with bronchography, three quarters were in adults, and mismanagement of general anesthesia occurred five times as often as toxic reactions to local anesthesia. The latter fact is of special interest in that the overwhelming majority of these procedures in Baltimore were (and still are) done under local anesthesia.

An additional morbidity and mortality related to this problem does not appear in anesthesia or surgical mortality figures. This is related to the failure to resort to bronchoscopy in the desperately ill when its use may be life-saving, a subject which will be discussed at the end of this paper.

From this it is clear that, although optimal operating conditions and patient comfort

should be factors in anesthetic choice, the safety of the patient must be the prime concern.

## The Case for General Anesthesia

The simple fact that there has been a strong swing toward general anesthesia for peroral endoscopy during the past 20 years might be considered evidence in its favor. There are at least two reasons for questioning such a conclusion. First, although there are about equal numbers of papers appearing in the current literature in favor of general<sup>7, 29, 37, 47, 48, 57</sup> and topical anesthesia,<sup>5, 20, 26, 40, 41, 55</sup> there still appears to be a better than two-to-one preference for local anesthesia on the part of chiefs of service in the larger E.N.T. clinics.<sup>20</sup> Second, among those whose strong preference is for general anesthesia are many, such as thoracic surgeons, to whom peroral endoscopy is not a prime interest and whose judgement therefore may be influenced by impatience with the tedium of topical anesthesia.

In this connection it is unfortunate that proponents on either side of the fence write persuasively of the advantages of their choices, but seldom indulge in a thorough discussion of the reasons for the choice based upon the problem presented by the individual patient. Such reasons will be detailed in the discussion at the end of this review. For now, suffice it to say that there are instances in which general anesthesia is mandatory, and others where it is clearly the procedure of choice. In such instances what are the optimum techniques?

It is unfortunate that any surgical procedure done under general anesthesia should be classed as "minor." There are no "minor" general anesthetics. If this is clearly recognized, then it follows as the night the day that those patients deserve the same preanesthetic work-up accorded to other patients being sub-

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mitted to general anesthesia. This idea is unpopular, and I have not found a paper in which it is stressed.

Praenesthetic medication is a matter of personal choice of the anesthesiologist. A major consideration is that prolonged post-operative depression should be avoided. Many of these patients suffer from respiratory disease, and the cough reflex is a key part of their defence against complications. In view of the fact that these are brief procedures, in this author's view narcotics should generally be avoided.

Some endoscopists like to administer topical anesthesia before, and others after, induction of general anesthesia. The purpose seems to be to avoid laryngospasm or coughing with light levels of general anesthesia. It seems doubtful that the gain outweighs the disadvantage of submitting the patient to the hazards of two sets of drugs. When topical is administered after induction of general anesthesia there is sometimes a tendency to be careless about dosage. There is special danger here in that the early signs of a toxic reaction will be masked by general anesthesia and a full-blown toxic reaction may become apparent only as the general anesthetic wears off.<sup>22</sup>

One author<sup>7</sup> makes a special point of omitting topical anesthesia to assure a good cough reflex on awakening. This seems to be a point worthy of consideration, although most patients cough vigorously following bronchoscopy regardless of type of anesthesia. A short-acting intravenous barbiturate seems to be the drug of choice; but if spontaneous respirations are desired, halothane is probably preferable.

By far the most popular technique is the combination of intravenous barbiturate and succinylcholine.<sup>26, 27, 47, 48</sup> The total relaxation thus achieved seems to make the operative procedure easier in some hands.

If this apneic technique is employed, the question of a choice between oxygen insufflation and artificial respiration arises. The former is still popular in some quarters; but it is now generally recognized that, although oxygenation may be adequate, hypercapnea is inevitable unless  $\text{PaCO}_2$  has been remarkably lowered initially. Except in very brief procedures (less than five minutes) artificial res-

piration is preferable. Zeitlin<sup>57</sup> has calculated that even with high rates of oxygen insufflation only about one eighth of  $\text{CO}_2$  output is removed. He finds a rise in arterial  $\text{PCO}_2$  of 3.3 mm. Hg/minute.

Nearly everyone has abandoned the cuirass type of respirator as unpredictable, and uses some modification of the ventilating bronchoscope. For laryngoscopy, if the apneic technique is chosen, some semblance of pulmonary ventilation can be attempted through a small nasotracheal catheter which may not seriously interfere with the laryngoscopy.<sup>27</sup>

There are two other laryngoscopic situations in which general anesthesia may be preferable to topical. One of these is the unusual jaw which makes direct laryngoscopy painful regardless of the adequacy of topical anesthesia. The other is suspension laryngoscopy where discomfort of the patient and convenience of the operator are major considerations.

In both of these circumstances hyperventilation with oxygen for five to ten minutes just prior to the operative procedure may prevent anoxia or severe hypercapnia if the operation is not too prolonged.

If the apneic technique is chosen, the anesthesiologist should be aware of the severe generalized muscle pain which the patient may have for days after rapid injection of large doses of succinylcholine. Smaller doses administered more slowly are not followed by such severe pain.

From the point of view of the bronchoscopist, the apneic patient who does not cough is not the ideal subject for obtaining specimens for bacteriology or cytology or for tracking down the source of an elusive hemoptysis. Also, much that one learns from observing the dynamic behavior of the airways during breathing and coughing is lost unless the anesthesiologist is able to have the patient awaken at the proper moment.

Some surgeons feel that esophagoscopy under topical anesthesia increases the risk of esophageal perforation. This conclusion seems justifiable only if the patient is extremely uncooperative or in the presence of a large esophageal foreign body. If the esophagoscope is always passed through the pharyngeal constrictors over a filament guide bougie perforation should not occur.

There seem to be no indications for bronchography under general anesthesia in the adult.

When general anesthesia is used in the child, halothane seems the drug of choice for most patients. The apneic technique seems unnecessary for endoscopic examination, but may be quite useful for bronchography to assure optimum radiographs. Supplementing general with topical anesthesia also seems to us unnecessary in the child, and this author would certainly disagree with the high dosage of topical anesthetic sometimes recommended.<sup>29</sup>

For esophagoscopy in children, tracheal intubation is absolutely mandatory, to avoid pressure on the party wall with the trachea and respiratory obstruction. It is surprising that this simple fact is not generally recognized, nor is it stressed in current literature.

General anesthesia is commonly employed for bronchography in children.<sup>30</sup> The child should be bronchoscoped 24 to 48 hours ahead of time to assure a clean bronchial tree and to rule out pathological airway problems which might make bronchography hazardous.

After induction of general anesthesia an orotracheal tube with nipple adaptor is passed and the tracheobronchial tree is aspirated. A catheter much smaller than the tracheal tube is passed through the nipple. Succinylcholine is then administered and respiration is taken over by the anesthetist, temporarily suspended during the taking of each film.<sup>18</sup> At the conclusion of the examination the tracheobronchial tree is again aspirated before the removal of the tube.

When there is an adverse reaction to bronchography it is important to try to determine whether the radiopaque agent or the anesthesia is responsible. Approximately a third of all patients react unfavorably to today's irritating bronchographic media.<sup>35, 42</sup>

### The Case for Topical Anesthesia

Just as there are instances when general anesthesia is preferable, there are many when topical anesthesia is the technique of choice. One major disadvantage of the present popularity of general anesthesia lies in the fact that the surgeon accustomed to patients under general anesthesia will be loathe to attempt topical even when it is clearly indicated. The

surgeon accustomed to topical anesthesia will never hesitate to employ general if there are reasons for doing so. All endoscopists (and for that matter all anesthesiologists) should be thoroughly familiar with and skilled in the administration of topical anesthesia for bronchoscopy.

It is this author's opinion that tracheal intubation under topical anesthesia in the desperately ill, or the patient with intestinal obstruction or upper gastrointestinal bleeding, can be life-saving. Once the airway is established in the awake patient it is surprising how much less general anesthetic drug is required for satisfactory, safe induction. Unless the anesthesiologist is well trained and experienced in the technique he will hesitate to resort to it even when he feels it may be indicated. In addition to this consideration is the fact that there is a rare patient with cervical or facial abnormalities which make intubation in the conventional manner nearly impossible. Many such patients can be intubated with relative ease awake, sitting up, after topical anesthesia, through the use of a laryngeal mirror and a properly-shaped stylet.

Some authors now recommend bilateral injection of the superior laryngeal nerve combined with topical anesthesia. This is a quick, simple, useful procedure, and the only question is whether some patients may find the conventional application of topical anesthesia preferable to the bilateral injection. The technique is well described in the paper by Gaskill and Gillies.<sup>20</sup>

The method of applying the topical agent ranges from aerosol inhalation, through conventional sprays and instillation, (through the larynx or transtracheal), to painting the surface with cotton applicators. Some recommend dissolving tablets in the mouth<sup>12</sup> or swallowing solutions of anesthetic (for esophagoscopy). Lollipops containing anesthetic agents and viscous suspensions of anesthetic agents have also been used.

Choice of technique should be made with the following goals in mind:

1. Maximum anesthesia of the parts to be stimulated with minimum absorption through other surfaces.

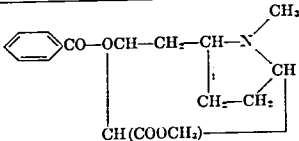
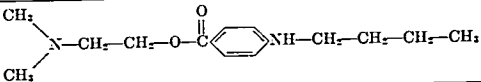
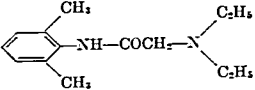
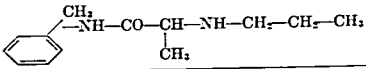
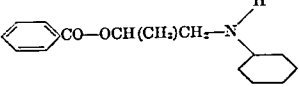
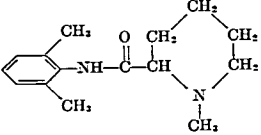
2. Completion of the anesthesia before the first applications wear off.
3. Slow absorption of anesthetic agent and, therefore, avoidance of hazardous peaks in concentration in the blood stream.

Topical anesthetic agents are absorbed rapidly from respiratory mucosa, so blood levels may be comparable to those with slow intravenous injection.<sup>1, 2, 4, 10</sup> Most of these agents seem to be metabolized rapidly. With any single application the peak concentration in the blood stream is reached within a few minutes and immediately begins to fall.<sup>26</sup>

Thus, any technique which delivers a large quantity of drug to the mucosal surface in a matter of seconds carries a hazard far greater than one which delivers the same quantity a little bit at a time over a period of 10 to 15 minutes.

If repeated applications of anesthetic agent are timed properly, the appearance in the blood stream of the drug from each single application will coincide with the falling limb of the blood concentration curve from the previous one. In this manner the peak blood level of drug need be no higher for the total dose than it initially was with the first tenth of the total dose.

TABLE 1.

Generic Name	Other Names	Chemical Structure
Cocaine	None	
Tetracaine	Pontocaine Pantocaine	
Lidocaine	Xylocaine Lignocaine	
Prilocaine	Citanest Propitocaine	
Hexylcaine	Cyclaine	
Mepivacaine	Carbocaine	



by more than one name (table 1). It would seem highly desirable in dealing with such potent drugs that the medical profession agree on an international nomenclature and that all preparations by whatever drug company display this name most prominently on the label.

The author has had experience with only cocaine, tetracaine and lidocaine. Cocaine seems the drug of choice where concomitant vasoconstriction is desired. Lidocaine seems the drug of choice for nerve block and infiltration, and is widely used for topical application. Tetracaine seems the drug of choice for topical application when vasoconstriction is not desirable. Both cocaine and tetracaine are faster-acting topically than lidocaine. Proparacaine is also said to be very fast in topical action. For some reason its use has been largely confined to ophthalmology.

Vasoconstriction may be useful both for limiting the rapidity of passage of the anesthetic agent into the blood stream (thus reducing peak blood levels and prolonging anesthetic effect) and for reducing hemorrhage if incisional or excisional surgery is to be done. The addition of epinephrine (1:200,000) will result in somewhat more vasoconstriction than is seen with cocaine alone. This is not ordinarily indicated in either endoscopy or bronchography.

Purely from the point of view of procuring diagnostic information from endoscopy, vasoconstriction is to be avoided. Mucosal color changes and areas of inflammation may be obscured after application of cocaine. Thus, for most diagnostic laryngoscopy and bronchoscopy, tetracaine is preferable. In some patients the only clue to the location of a carcinoma *in situ* may be a localized area of redness.

Although lidocaine is used widely and successfully, this author continues to prefer cocaine or tetracaine for topical anesthesia. This preference is based upon the following. First is the subjective impression that with lidocaine the time of onset is longer and the depth of topical anesthesia less satisfactory than with cocaine or tetracaine. Many patients who have been bronchoscoped with both lidocaine and tetracaine will volunteer the information that the process of anesthetization

was more unpleasant and the anesthesia less satisfactory with the former.

The second reason comes under the heading of "straight from the horse's mouth." Some years ago, when Löfgren (the discoverer of lidocaine)<sup>21</sup> was to be bronchoscoped, he was asked by his eminent bronchoscopist if he preferred xylocaine for the topical anesthesia. The prompt reply was, "No, no—Pontocaine."

From time to time one reads reports about both cocaine and tetracaine condemning them as more toxic than other agents. The fact that they are used more commonly than other local anesthetic drugs usually is not given proper consideration.

Some years ago Furstenberg<sup>19</sup> reported a series of 30,000 tonsillectomies with cocaine anesthesia. There were three fatalities, of which only one seemed to be a toxic reaction to cocaine. This is a record for safety that anyone will have trouble matching.

Numerous reports<sup>11, 22, 40, 42, 52, 56</sup> indicate that prilocaine may be used increasingly as a topical anesthetic. It appears to combine long local action (probably from tissue binding) with rapid metabolic degeneration in the blood stream. There is a disadvantage in the development of methemoglobinemia (up to 10 per cent) in some instances; but this has not proven a serious complication and is said to respond readily to methylene blue.

It is inevitable that new drugs will be developed. Perhaps a better one will come along. Meanwhile, the physician should realize that the drugs now available are effective and safe when properly used, and that claims of low toxicity with new agents should be treated with great caution.

The concentration of drug employed is another matter of debate. For tetracaine, for instance, one finds 0.5 per cent, 1 per cent, and 2 per cent all recommended by reputable and experienced physicians for the same procedure. The choice of concentration should depend upon:

1. The total dose safe to administer over a given period of time.
2. The surface area to be covered.
3. The concentration producing maximal local anesthetic effect.

In our experience, for topical application slowly over 10 to 15 minutes, the safe maximum dose for the adult is 80 mg. tetracaine (1.3 mg./kg.), 160 mg. lidocaine (2.6 mg./kg.), and 400 mg. cocaine (6.6 mg./kg.). It is perfectly true that double these doses can be used in the majority of patients without a toxic reaction; but if the occasional tragedy is to be averted, the suggested maximum should never be exceeded. With tetracaine for bronchoscopy, 2.0 ml. of 2 per cent tetracaine would be painted on the surface and 2.0-4.0 ml. of 0.5 per cent would be instilled, leaving a margin of 20 to 30 mg. below the maximum.

One of the disadvantages of the use of a spray is the near-impossibility of determining the actual quantity delivered to the patient. Its other disadvantage is the inevitable deposition of some of the spray on oral and pharyngeal mucosa where it is not needed.

In the child these doses should be reduced according to weight. In the small child the resulting volume of 2 per cent tetracaine (approximately 1 ml./15 kg.) becomes awkwardly small. Therefore, twice the volume of 1 per cent (or even four times the volume of 0.5 per cent) is generally employed. The only toxic reaction to local anesthesia this author has had in 31 years of practice was during bronchography in a one-year-old child in whom this dose was exceeded. Fortunately, it was a nonfatal convulsive reaction. This child was in a series of approximately 500 children in whom bronchograms were done under topical tetracaine anesthesia between 1944 and 1951.

We have never been able to document a serious toxic reaction which has not been attributable to exceeding these doses. The idea of sudden death from reaction to a small dose of local anesthetic seems fictitious. Mild allergic reactions to ordinary doses have been reported.<sup>24</sup> There is a report<sup>22</sup> of a fatality in a 20-kg. 6-year-old child from 80 mg. of lidocaine; but this was administered in a spray and may have been absorbed very rapidly. The child was seriously ill with tuberculosis. Our maximum safe dose for this child would have been 52 mg.

It has been suggested that cardiac arrhythmias may be more or less likely under local anesthesia. Recent work indicates that they

seem to be related to laryngoscopic and bronchoscopic manipulations and are not necessarily eliminated by local anesthesia, general anesthesia or vagolytic drugs (unless the latter are administered in unusually high doses, five to six times the usual preanesthetic dose).<sup>26, 44</sup>

There is evidence that most local anesthetics have some antibacterial and antifungal activity and that they may interfere with bacteriologic studies.<sup>15</sup> Proparacaine seems free from this fault if used without the usual chlorobutanol preservative.<sup>30</sup>

Many authors report the value of a variety of ancillary drugs to add their sedative effects.<sup>17, 36, 45, 46</sup> Good teachers of anesthesiology stress the desirability of simplicity in anesthesia. It is possible to manage the overwhelming majority of patients with simple, well-known, time-tested general or local anesthetic agents. Supplementing such agents should be resorted to only for good reasons, and then with utmost caution.

There is the belief in some quarters that the use of two local anesthetics, each in half the usual dosage, will reduce the chances for toxic reaction. We know of no substantiation for such a belief and feel it might lead to an entirely false sense of security. Toxic effects of all the commonly used local anesthetics are almost certainly cumulative.

Topical anesthesia for bronchography may be produced in the conventional way or by injection directly into the trachea through the cricothyroid membrane. Properly performed, the latter technique has much to recommend it. Anesthesia to the larynx and upper respiratory tract is thus avoided as the catheter can be passed directly through the cricothyroid needle into the trachea.<sup>8, 24</sup> The amount of topical anesthetic should be limited to that listed above; but special care must be taken to assure slow injection because of the possibility of very rapid absorption if any reaches the alveoli.

Most children can be managed as readily for endoscopy (excluding esophagoscopy) or bronchography with topical anesthesia as adults. Appropriately smaller dosages in proportion to body weight are employed and, as in the adult, administered slowly.

The major differences in caring for children

as patients are in the extra gentleness and consideration with which the child is handled and in the premedication. We prefer a combination of scopolamine, pentobarbital, and morphine. These drugs are all well tolerated by children and, if the proper dose is administered, the child will be drowsy, easy to manage, and will have a moderate amnesia for the event. The author has bronchoscoped a number of children repeatedly without general anesthesia and has no difficulty maintaining a friendly relationship with them.

Premedication for bronchography should be somewhat lighter than for bronchoscopy since it is desirable for the child to cooperate in this procedure.

Infants less than a year of age can be laryngoscoped or bronchoscoped with little or no premedication or anesthesia.

The basic pharmacology of local anesthetic drugs continues to be investigated.<sup>4, 13, 21, 28, 31, 34, 35, 56</sup> This is not the place for a review of that broad subject. Patel<sup>29</sup> studied six chemical analogues of lidocaine and found that one ("compound F") was considerably more potent and less toxic than lidocaine. So far as we know nothing more has been heard about this compound. Lutsch<sup>33</sup> has made the interesting observation that toxic reactions to local anesthetics may be related to the circadian periodicity of the experimental animal. If this finding turns out to be applicable to man we shall have to adjust dosage to time of day. Two papers<sup>27, 32</sup> report that elevated arterial  $P_{CO_2}$  is related to susceptibility to the convulsive reaction to local anesthetics. If true, this is one more reason to avoid hypercapnia carefully.

Little information is available about the effects of these drugs on the mucociliary function of the mucous membranes to which they are applied. There is indication that hexylcaine has an especially undesirable effect,<sup>6</sup> and that lidocaine is more innocuous than tetracaine.<sup>10</sup> Unfortunately, local anesthetic drugs are not routinely submitted to such studies, and the reports in the literature generally involve investigations *in vitro* or in animals other than man. Techniques are now available for making suitable tests in man<sup>8</sup> and it

is hoped that a search will be made for mucociliary effects of all drugs used topically on mucous membranes.

The question of the usefulness of premedication in preventing toxic reactions, which has been discussed for decades, remains unanswered. Steinhaus<sup>42</sup> reported years ago that barbiturates were useless in this respect. Others have felt, for both clinical reasons and from work done in the laboratory, that they might be of help.<sup>†</sup> Some recent work in part substantiates this belief.<sup>23</sup> It seems reasonable, at least until more evidence is available, to continue to premedicate with one of the barbiturates.

There seems to be no disagreement about the nature of toxic reactions to local anesthetics, their prevention or treatment. The problem is that they still occur and deaths still result. Some physicians continue to be unaware of the early symptoms of toxicity, some still believe that unnecessarily large doses of anesthetic are safe because the average patient will tolerate them, and some are unaware of the steps immediately necessary for treatment of a reaction or are unwilling to be continually prepared to exercise them.

Toxic reactions to local anesthetics appear in the following order:

1. Tremulousness and pallor, sometimes accompanied by dizziness, nausea, or faintness. This reaction is seen only if overdosage is produced gradually. Some of these symptoms may arise from an excess of adrenalin in the medication or an overdose of narcotic. If overdosage of a local anesthetic agent is produced rapidly (as it too often is) these symptoms may never be noted.
2. Collapse, with or without loss of consciousness, followed or preceded by generalized convulsions. This sequence is a sign that gross overdosage has not quite been reached. Prompt reasonable therapy will invariably result in a return to normal, usually within a few minutes.

\* Proctor, D. F., Baltimore, work in progress and soon to be reported.

† Carlens, E. Personal communication, 1955, Stockholm.



3. Sudden collapse with respiratory arrest accompanied by or promptly followed by severe hypotension and cardiac arrest.

Treatment must be thought of in the following order:

1. Before the local anesthetic is begun the physician should be certain that all means of resuscitation are at hand and in good working order. The very fact that these reactions are so rare provides good reason for always being fully prepared.
2. At the first sign that a toxic reaction may be developing administration of the anesthetic agent must be stopped, a finger is placed on the patient's pulse, and a running series of questions is started to keep aware of the patient's reactions. At the same time nearby help is alerted.
3. If convulsions begin the patient is given an intravenous barbiturate promptly and provided with oxygen by mask. Generally this will suffice, but one should be prepared for the next steps if necessary.
4. Respiratory collapse or arrest is treated by artificial respiration (mouth to mouth, intubation, or bag and mask). Vasopressors are given if necessary and external cardiac massage is begun if cardiac arrest seems possible.
5. The only place for sedative drugs in the management of the patient with a local anesthetic reaction is in the control of convulsions.

In a clinic where these procedures are routine there is a strong tendency to set up excellent procedures after the first death. Everyone is alert to the danger for about a year, and then attention falls off unless another tragedy occurs. The only way to assure over-ready personnel is to have regular recurring rehearsals, full dress, to be certain that all equipment and drugs are available, in good working order, and that their location is known to everyone.

Wherever local anesthetics are employed the following should be immediately at hand, checked frequently for inventory and function, and their location known to all nurse and physician personnel:

1. Intravenous barbiturate, needles, and syringes.
2. Safar mouth-to-mouth airway.
3. Source of oxygen.
4. Reservoir bag and set of masks (anesthesia machine is desirable).
5. Set of orotracheal tubes with anesthetic adapters attached.
6. Laryngoscope with set of blades.
7. Epinephrine and other drugs for cardiac resuscitation.
8. Defibrillator with ECG monitor.
9. Blood pressure cuff, manometer, and stethoscope.
10. Set-up for administering fluids intravenously.

At least once a year (or more often if personnel is changed) a session should be held with the endoscopic and anesthesia staff, at which all of the steps in resuscitation are explained and rehearsed.

## Discussion

The key controversy regarding this problem involves the choice of local or general anesthesia. This author believes that each patient should be considered as an individual problem and the choice made with the following factors in mind (roughly in the order of their importance):

1. Esophagoscopy in a child requires a tracheal tube and therefore should be done under general anesthesia.
2. The poor-risk patient, the acute or severe chronic respiratory problem, and the patient with an already-compromised airway should be managed with topical anesthesia, and will require very little of that.<sup>9</sup>
3. The patient who is terrified at the mere idea of the procedure (especially the claustrophobia) should be given a general anesthetic if at all possible.
4. Large children and adolescents should be given general anesthesia unless the physician knows them well and can count on cooperation.

5. Unless skillful management of the general anesthesia is assured through an experienced capable anesthesiologist, general anesthesia should be avoided.

6. Unless skillful endoscopic technique is assured, topical anesthesia is a hard trial on the patient. This is especially true of the endoscopist who requires 30 to 60 minutes or more for a single procedure. Topical anesthesia may not last this long and the endoscopic positions are too uncomfortable for prolonged maintenance.

7. To gain the greatest amount of information in the difficult diagnostic problem, topical anesthesia is preferable.

8. Some (but by no means all) foreign-body problems may be managed more safely under general anesthesia. Each foreign-body problem merits special consideration. In general, large sharp esophageal foreign bodies or those offering very difficult removal problems justify general anesthesia.

If general anesthesia is chosen, except in very brief procedures, normal pulmonary ventilation should be assured by use of a ventilating bronchoscope.

If topical anesthesia is chosen, resuscitative equipment must be at hand and ready for use. Safe maximum doses of anesthetic should never be exceeded, and they should be administered slowly.

A final consideration has to do with the poor-risk patient. The major objection to the increasingly wide use of general anesthesia for endoscopy lies in the unwillingness of the young physician trained with this technique to bronchoscope the desperately-ill patient under topical anesthesia. One frequently encounters the situation today when the desperately-ill patient with atelectasis or severely obstructive secretions is denied bronchoscopy because he is "too ill."

To the physician thoroughly trained and experienced in the technique nothing is simpler than the quick application of minimal topical anesthesia and rapid bronchoscopy. The patient does not need to leave his bed. Oxygen can be delivered and respirations assisted through the ventilating bronchoscope. The entire procedure need take only a few minutes. Anyone who has seen the dramatic

improvement in some of these patients who appear to be at death's door will appreciate the tragedy of the assumption that they are too ill to be bronchoscoped.

### Summary

Proper anesthetic management for peroral endoscopy and bronchography continues to be controversial. Mortality associated with mismanagement of these patients continues to be needlessly high. The decision for local or general anesthesia should be made not on the basis of personal preference or local custom but because of special consideration of each individual patient problem. The choice of topical anesthetic agent is not as important as its safe administration. No local anesthetic is free from danger if safe dosage is exceeded. Whenever local anesthetics are employed all means of resuscitation must be continually at hand and personnel must know how to use them. As is true in all surgical situations, skill, gentleness, and courteous consideration of both anesthesiologist and surgeon are blessings to be highly prized.

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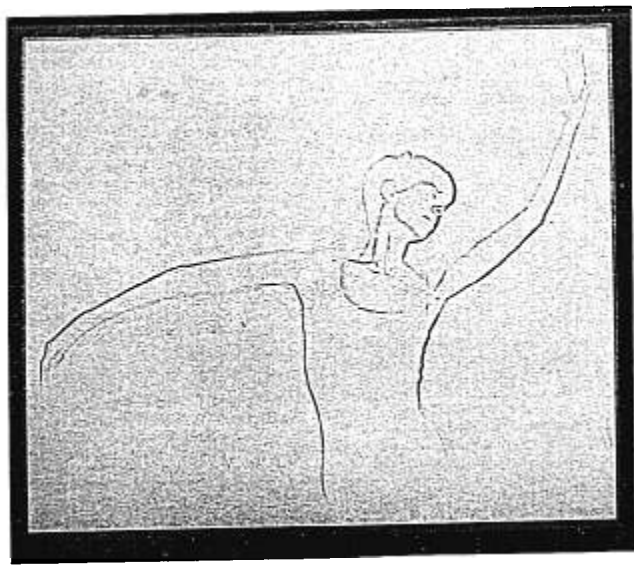


Photo of a dancer by Meyer Saklad, M.D., Providence, R. I., placed first in black and white photography at the 1967 Physicians' Art Exhibit.