ANESTHESIA FROM THE VIEWPOINT OF THE THORACIC SURGEON

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Received for publication February 7, 1949

Many of us remember that era in the developmental period of thoracic surgery when nitrous oxide and oxygen was usually the anesthetic of choice, when it was frequently administered by a nurse or relatively inexperienced physician, most often without the introduction of an endotracheal tube, and when as a result, the period of operation was, with dismaying frequency, a race between the surgeon and the impending asphyxia of the patient. The results were too often catastrophic and these were reflected in the high mortality rates for many of the procedures of thoracic surgery that are today carried out with minimal risk. It is mutually understandable to us, then, when one expresses relief and good riddance for the passing of the "good old days."

I wish to comment upon what has seemed desirable, useful and important to the thoracic surgeon as he sees his patient through the operative period when the actual conduct of the anesthesia shall have been entrusted to the anesthesiologist and in the periods immediately preceding and following the actual operation when the teamwork between surgeon and anesthesiologist begins and is continued.

Actually, the operation begins the night before and, of recent years, the practice of the anesthesiologist of seeing, examining and becoming acquainted with the patient, as well as ordering the preoperative medication, is highly desirable. I invariably sit down at the bedside for a few moments and explain to the patient in detail what he is to expect. Much can be done to allay the apprehensions arising both before and after operation if the patient understands that when he awakes his feet will be higher than his head, that he will have a variety of tubes in his nose, mouth, arms and legs as well as in his chest and possibly his abdomen, and that he may be receiving a blood transfusion—as a part of the normal routine. If the purpose is made clear to him, he will cooperate better when he is encouraged to cough, even though it hurts him. Too often we forget the words of Moynihan

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who pointed out that what is routine to us may be the most momentous happening in the life of the patient up to that moment.

It would be presumptuous for me to discuss the actual management of the anesthesia. There are, however, certain aspects of anesthesiology which directly affect the surgeon as a surgical technician and it is in connection with these that I should like to offer a few observations.

The selection of the anesthetic agent properly lies in the anesthetist's hands. Ether is an excellent anesthetic agent for almost all thoracic procedures and under most circumstances. Whether one chooses to induce anesthesia with intravenous pentothal or nembutal with the addition of curare for intubation depends upon the desirability of using the endothermic cautery for the control of bleeders in skin and muscle when the elimination of an explosive mixture is, of course, important. For my own part, I will gladly dispense with the coagulating unit if the anesthesiologist prefers it in a given case. Needless complexity of anesthetic agents with the accompanying potential complications seems to me unsatisfactory. Recently the use of intravenous nembutal for endoscopic examinations has proved useful. The skillful employment of ether or any other agent in thoracic surgery always aims for the early postoperative return of the cough reflex and consciousness.

With respect to the adjuncts to the evaluation of the patient as an operative risk in thoracic surgery, one must mention the increasing importance of the assay of the pulmonary status by means of the various pulmonary ventilatory and function studies including maximum breathing capacity, walking ventilatory studies and bronchospirometry. This is still pioneer work and much remains to be done in the way of standardization of the tests. But the tests are instruments of increasing precision. By their means some idea may now be obtained of how much a patient may tolerate with one pleural cavity open, and the likelihood of his becoming a respiratory cripple if too much lung is resected or too extensive collapse measures are perpetrated. In other words, a method is available for recognition of the patients respiratory potential, particularly in the borderline case, that may influence us in other practical ways, such as the position of the patient on the table.

The sine qua non of good anesthesia for intrathoracic surgery or, for that matter, for any surgery, is a clear airway with the possibility of controlled respiration if necessary. This postulates an endotracheal tube of adequate lumen in order to facilitate positive pressure for inflation of the lung during and at the conclusion of the operation, and to permit easy aspiration of secretions at all times. The surgeon prefers to operate in a quiet field and lack of obstruction is a prerequisite for its accomplishment. On the other hand, the induction of apnea is never necessary and, on the contrary, to be avoided.
Uninvolved lung tissue should be re-expanded frequently during the operation at times mutually convenient for surgeon and anesthesiologist in order to render less likely the postoperative complications of atelectasis. The anesthesiologist will, of course, always notify the surgeon in advance in order that work on large vessels may be suspended or the inflation postponed until the technical situation is more advantageous to the surgeon. Aspiration of secretions should be carried out at short intervals routinely whether or not secretions appear to be present. This point cannot be emphasized too strongly. A review of table deaths brings home the importance of the insidious accumulation of blood or secretions which may suddenly reach a critical level and death supervene with great rapidity. Moreover, the cumulative effect of prolonged anoxia is too well known to all of us to expand upon the necessity for the frequently repeated clearing of the airway.

In this connection, there is no greater problem to the thoracic surgeon or anesthesiologist than that of the patient who has been bleeding copiously intermittently and who obviously requires some type of pulmonary resection for the control of this hemorrhage.

I have no revolutionary suggestions for handling these patients. Various types of endobronchial balloons as well as selective lobar bronchial packing have been proposed and used successfully. What it usually comes down to is the selection of optimal time for operation on the basis of clinical judgment, and there is no rule of thumb for making this clinical decision. Too frequently a decision to operate coincides with a fresh episode of bleeding which could be either the fatal episode or the episode following which there will be no further bleeding. And so it may go until the patient has become too depleted to withstand a surgical procedure. In the light of my experience with these harrowing vicious circles, I have chosen to operate within a few hours after the subsidence of an early episode of repetitive bleeding, assuming, of course, that diagnosis and localization are certain. To the surgeon, there is no completely satisfactory method for the control of serious bleeding other than the direct ligation of the blood vessel responsible. It is, therefore, at this point that the skill of the anesthesiologist dominates the situation in order that the surgeon may be permitted to accomplish this ligation. More than a little sedation, careful induction and intubation to avoid coughing and dislodgement of the clot and extreme gentleness in positioning the patient on the table are all essential in preventing a fresh hemorrhage until the chest can be opened rapidly and the bronchus occluded by tie or clamp or tourniquet.

The administration of fluids during operation is now usually in the realm of the anesthesiologist. Nowadays this usually means replacement therapy with whole blood and, in time-consuming procedures such as esophagectomy with esophagogastrostomy, may entail the administration of several liters. The situation demands nice
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judgment in order to keep up with actual blood loss, prevent shock, and yet avoid fatal pulmonary edema which may occur in patients undergoing pneumonectomy if excessive quantities of fluid are given intravenously. In all instances in which extensive acute blood loss is possible, a suitable device for the administration of blood under pressure should be in place and immediately available at the start of the operation. In our clinics this is accomplished by placing a three-way stopcock in the intravenous system.

While it is a prime function of the anesthesiologist to make the job easier for the surgeon, there are several instances in which the surgeon can improve the situation of the anesthesiologist. Directly blocking the intercostal nerves with nupercaine in oil for several segments above and below the proposed site of thoracotomy, once the ribs are exposed, makes for quieter respirations and stability of pulse when the rib spreader is placed and opened. It is at this point, particularly if the anesthesiologist has carried the patient on pentothal and gas oxygen in order that the surgeon may use the coagulating current, that "bucking," irregular respirations or even apnea, owing to the intense peripheral stimulation, may occur. If the anesthesiologist is not able to observe for himself, he should be notified in advance of this point in the procedure and the surgeon can, by slowly opening the spreader, after the anesthesiologist has his patient controlled, contribute to the serenity of this phase. Frequently the patient with excessive irritability during the course of exploration or dissection about the hilus may be quieted by the simple expedient of blocking the vagus and pulmonary plexus with 2 per cent procaine.

Although there have been mishaps associated with the practice, I believe that immediate postoperative bronchoscopy should be carried out in virtually every case. Almost without exception, one is impressed by the amount of secretion remaining in the trachea and major bronchi which have been considered to have been aspirated dry by means of the catheter through the endotracheal tube. Routine bronchoscopy is of great importance in reducing the incidence of postoperative pulmonary complications. True, it is necessary that the patient be maintained in a plane of anesthesia that will give adequate relaxation for the satisfactory performance of bronchoscopy at the conclusion of the operation, and it follows that the return of the cough reflex will, therefore, be proportionately delayed. Many anesthesiologists of long experience and ripe judgment have questioned the desirability of this course, preferring to have the patient awake and coughing as soon as possible. This point is well made. To me, there is greater security in making certain that the patient leaves the table with a dry tracheobronchial tree, feeling that it is reasonably sure that secretions, in great amount, will not re-accumulate until the additional period before the return of consciousness has elapsed.
In the days immediately after operation recourse to bronchoscopy is undertaken without hesitation if there is any question of retained secretions which cannot be cleared by coughing or suction with the endotracheal catheter. Apparently satisfactory results, as indicated by the quantity of secretion obtained by endotracheal catheter suction, are by no means a guarantee that even larger amounts do not remain. Bronchoscopy should be performed in all such cases when there is not good clinical response in order to be certain that the catheter suction is as efficient as it appears.

Of recent years the position of the patient on the table for major intrathoracic procedures has been the subject of some discussion. There is no question that the obese patient with pulmonary function impaired, for instance, by emphysema, tolerates his operation better if he is placed on his back than if he is made to lie in the lateral decubitus position. This probably is also true of the prone or face-down position as its advocates claim. Other advantages of this position are said to be a quieter mediastinum and, perhaps more important, a reduction in the incidence of contralateral spreads in the tuberculous patient, since gravitation of secretions to the unoperated side is less likely to occur. Several surgeons have changed their routines during the past year to include this position. All who have done so consider it an improvement. I have had no personal experience with the face-down position and cannot, therefore, comment at first hand. The improvements in operative technics and the usefulness of streptomycin as an adjuvant in the surgery of the tuberculous, however, undoubtedly play a part in the reduction of the complications of pulmonary resection in tuberculosis. It is also of some interest to consider that the incidence of spreads in thoracoplasty, universally performed in the lateral position, is no greater than that following resection in the face-down position. Time and a large number of operations performed with the patient in this position will allow a better evaluation of its possibilities.

In conclusion, the advances in thoracic surgery during the past quarter of a century have been possible in a large measure because of the collateral development of anesthesiology and anesthesiologists should be congratulated for their notable contributions to this development.