

CASE REPORT

Anesthesia for Surgery of the Intrathoracic Portion of the Trachea

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Surgery of the intrathoracic portion of the trachea presents special anesthesia problems which in each case must be anticipated and discussed by the anesthesiologist and the surgeon so that a plan may be devised which will be mutually agreeable and as free from risk for the patient as possible.

In the last two decades, various approaches to the management of anesthesia for surgery of the intrathoracic portion of the trachea have been reported. Belsey¹ in 1950 reported a technique leaving the endotracheal tube above the lesion before the resection of the tumor and then advancing the tube below the defect. Clagett² in 1952 described a technique suggesting that the patient be bronchoscoped beyond the obstruction and then anesthetized. Bjork³ in 1952 suggested the use of Carlens tube introduced into the trachea with the aid of fluoroscopy and bronchoscopy under topical anesthesia prior to general anesthesia. Parrish⁴ in 1960 described a technique for ventilating the left lung through the operative wound. Woods *et al.*⁵ in 1961 described a technique using cardiopulmonary bypass.

The following case history is presented to illustrate some of the problems which may be encountered even after the anesthesiologist and surgeon have discussed and agreed upon a plan of approach which they believe will be adequate for resetting a tracheal tumor.

A 67 year old man with asthma and bronchitis since childhood was admitted to the hospital with the chief complaint of swelling of the lower legs and abdomen together with shortness of breath for several days duration. About 10 years previously, he had been hospitalized on several occasions with "heart attacks" characterized as chest pain relieved by nitroglycerin. During the last 4 or 5 years,

he had noted increasing shortness of breath on exertion and, more recently, even while at rest. Bronchoscopy 4 years ago revealed "prominent mucosa" in the distal trachea.

For the last few years, the patient had been a heavy smoker and drinker. At the time of admission, he was receiving digitoxin 0.15 mg., *q.i.d.*, diuril 500 mg., *b.i.d.*, and occasional mercuhydrin. With the exception of inspiratory and expiratory wheezes and fine rales heard in both lungs, and an enlarged heart, the remainder of the physical examination was negative. Electrocardiography showed atrial fibrillation, digitalis effect, and incomplete left bundle branch block. Abnormal laboratory data included: 1+ albuminuria, plasma phosphatase 4.0 units, and LDH 780 units. Bronchoscopy was repeated at this time, and the patient was found to have a large pedunculated tumor which almost completely occluded the distal trachea and extended downward to the top of the carina.

Consultation with the surgeon and the internist was made the night before operation and it was decided that, although the patient was a very poor surgical risk, transthoracic excision of the tumor would have to be performed in order to relieve the tracheal obstruction which was interfering with ventilation and aggravating the patient's heart condition (fig. 1a). Anesthetic management and surgical approach then were discussed. It was decided that after intravenous induction of anesthesia with sodium thiopental and during succinylcholine apnea an attempt should be made to pass a long endotracheal tube into the right main bronchus until the tip of it was beyond the tumor and then to withdraw the tube slowly until left lung inflation indicated that the tip of the endotracheal tube was just above the carina (fig. 1b). Subsequently, right thoracotomy would be performed, the trachea would be opened, and then under

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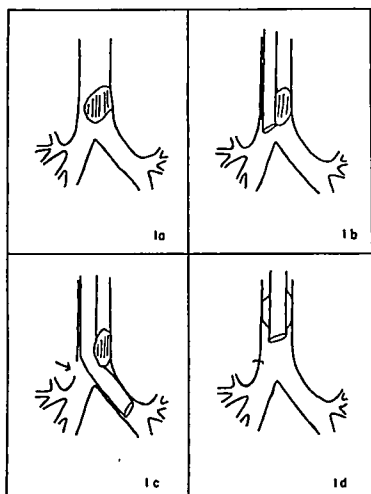


FIGURE 1.

direct vision the endotracheal tube would be advanced into the left main bronchus by the surgeon (fig. 1c). After removal of the tumor and closure of the tracheal opening, the endotracheal tube would be withdrawn into the trachea in order to ventilate both of the lungs during closure of the thoracotomy (fig. 1d).

The next morning the patient was given premedication, pentobarbital 100 mg. at 6:00 A.M. and meperidine 50 mg. and diphenhydramine 25 mg. at 7:00 A.M. Immediately before anesthesia was induced, the surgeon suggested a modification of the prearranged plan and the anesthesiologist agreed. The patient was intubated with a long cuffed anode tube (34 French) under topical anesthesia while awake. No attempt was made to insert the tip of the endotracheal tube beyond the tumor (fig. 2a). Then anesthesia was induced with intravenous sodium thiopental and maintained with nitrous oxide-oxygen mixture by inhalation. During right thoracotomy curare was administered to facilitate controlled ventilation, and the patient did well until the pleura was opened. As soon as the right lung was exposed, severe obstruction of the trachea developed and in a few seconds complete obstruction ensued (fig. 2b). The surgeon immediately exposed and

incised the trachea to visualize the tumor, and through the tracheal incision he inserted a Bizzarri-Giuffrida tube, prepared in advance, into the right main bronchus in order to ventilate the right lung by direct mouth-to-mouth breathing (fig. 2c). After removal of the tumor, the Bizzarri-Giuffrida tube was removed and the endotracheal anode tube was advanced into the left main bronchus for endobronchial anesthesia during closure of the tracheal incision (fig. 2d). During the period of obstructive respiratory distress, and before mouth-to-tube ventilation of the right lung could be instituted by the surgeon, severe cyanosis appeared and the blood pressure which had stabilized at 90/60 mm. of mercury became unobtainable for about 5 minutes. No change was observed either in the pulse rate and rhythm or in the electrocardiogram pattern during this episode. After endobronchial ventilation was established the circulation improved, but following excision of the tumor and closure of the tracheal incision the blood pressure fell again and phenylephrine 0.001 per cent was administered by intravenous drip. At the end of the procedure, the blood pressure stabilized at 100/60 mm. of mercury and

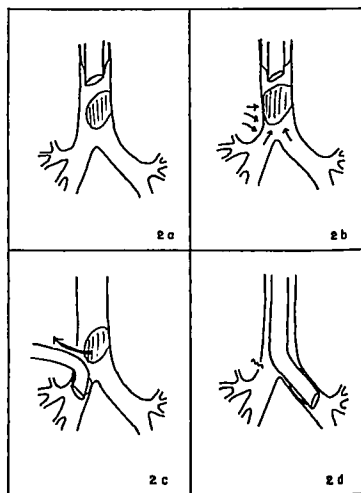


FIGURE 2.

the patient's condition did not appear critical. However, definite signs of cerebral damage became apparent after the first few days postoperatively. Deterioration progressed more rapidly after two weeks, and the patient died on the eighteenth postoperative day.

Autopsy was refused by the patient's relatives. The clinical impression was that the patient died of intractable congestive heart failure, probably secondary to multiple myocardial infarctions.

DISCUSSION

Recent case reports in the literature suggest that the use of cardiopulmonary bypass is indicated for surgery of the intrathoracic portion of the trachea.^{5, 6, 7} Without bypass, the case reported might have been managed better if the original plan had not been changed. Also, if instead of nitrous oxide an agent had been used with which a higher concentration of oxygen could have been given, desaturation of hemoglobin might not have developed so rapidly during the period of temporary tracheal obstruction, and the patient might have withstood this complication better if he had been hyperoxygenated at the time it occurred. The tumor was movable and once exposed it was resected with ease in only a few minutes.

However, since the time required in any given case cannot be predicted accurately, hypothermia and/or cardiopulmonary bypass techniques would appear to be indicated to minimize the risk of anesthesia and operation for the patient requiring transthoracic resection of an endotracheal tumor.

REFERENCES

1. Belsey, R.: Resection and reconstruction of the intrathoracic trachea, *Brit. J. Surg.* **38**: 200, 1950.
2. Clagett, O. T., Moersch, H. J., and Grindlay, J.: Intrathoracic tracheal tumors: development of surgical technic for their removal, *Ann. Surg.* **136**: 520, 1952.
3. Bjork, V. O., Carlens, E., and Crafoord, C.: The open closure of the bronchus and the resection of the carina and tracheal wall. *J. Thorac. Surg.* **23**: 419, 1952.
4. Parrish, C. M., and Jones, R.: Primary tracheal tumors, *Amer. Surg.* **26**: 95, 1960.
5. Woods, F., Neptune, W., and Pak tchi, A.: Resection of the carina and main stem bronchi with extracorporeal circulation, *New Engl. J. Med.* **264**: 492, 1961.
6. Nissen, V. R.: Extrakorpelle zirkulation fur langdauernde (30 minuten) atemunterbrechung zur operation bifurkationsnaher trachealgeschwulste, *Schweiz. Med. Wschr.* **91**: 957, 1961.
7. Adkins, P. D., and Izawa, E. M.: Resection of tracheal cylindroma using cardiopulmonary bypass, *Arch. Surg.* **88**: 405, 1964.

MITRAL STENOSIS The principal harmful effects of mitral stenosis are on lung function and structure. This is supported by the attendant physiologic and histologic alterations which include pulmonary hypertension, subintimal and medial thickening of precapillary vessels, recurrent bouts of pulmonary edema with associated inflammatory responses and their residua, gradual impairment of compliance, abnormal ventilation-perfusion patterns and a net reduction in the efficiency of ventilation. Great energy expenditure in breathing becomes necessary even at rest. Superimposed stresses such as exertion or pregnancy lead to a greater load on this inefficient system with increasing symptoms of dyspnea and fatigue. Mitral valvulotomy leads to prompt reduction in resting ventilation probably because of reduced pulmonary turgidity following lowered pressure throughout the pulmonary vascular bed. Mitral valvulotomy, therefore, should be performed promptly upon clear evidence (by catheterization) of pulmonary hypertension. (*Arnott, W. M., and Withering, W.: Physiologic Problems in Mitral Stenosis, Editorial, Amer. Heart J.* **68**: 145 (Aug.) 1964.)