

ANESTHESIA FOR THORACOLUMBAR SYMPATHECTOMY *

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INTRODUCTION

ALTHOUGH the etiology of essential hypertension is unknown, the results following sympathectomy of the Smithwick type (1) indicate that symptomatic relief can be obtained in this way. The normal blood pressure is largely dependent on cardiac output, blood volume and peripheral resistance. Signs of increased peripheral resistance are a constant finding in essential hypertension. It is toward the relief of this increased resistance by sympathectomy that the surgical treatment of the disease is directed.

Phelps and Burdick (2), in 1943, called attention to the anesthetic management of patients undergoing thoracolumbar sympathectomy for hypertension. Previous discussion of this problem has not stressed the importance of the instability of the autonomic nervous system. With an unstable autonomic nervous system as the basis of consideration, the choice of anesthesia should place emphasis on autonomic activity.

ANESTHETIC TECHNIC

The demands of the private practice of anesthesia in regard to operating schedules have placed undue emphasis on speed. In attempting to find a rapid yet safe induction for endotracheal anesthesia, the combination of pentothal and curare was tried. Intubation can be accomplished under this anesthesia if gentle laryngoscopy is practiced. The incidence of laryngospasm and the possibility of vagovagal cardiac reflexes are lessened by the use of curare, as well as the provision of additional relaxation.

A cuffed endotracheal tube is inserted under direct vision with a minimum of glottic stimulation. The tube and cuff are thoroughly lubricated with an anesthetic ointment which permits its toleration at a lighter level of anesthesia. It is our custom to use 1 per cent nupercaine ointment for this purpose. With these precautions it is still not unusual for the patient to cough during the first few minutes the endotracheal tube is in place. In our earlier cases, cyclopropane

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was added to control coughing, but we no longer do this as the patients soon quiet down without it.

After intubation, the patient is placed in a lateral position, with knees and thighs flexed upon the abdomen and held in place by adhesive tape. This can be done before the endotracheal tube is connected to the gas machine, providing precautions are taken to prevent the patient from biting the tube. Nitrous oxide and oxygen are then given by circle-absorption technic; a sufficient amount of gas is allowed to escape to provide for nitrogen excretion. The excellent analgesic properties of nitrous oxide make its combination with pentothal desirable. Likewise, its nonexplosive quality adds to the safety, since electrocoagulation equipment is used by the surgeon. Provided pen-

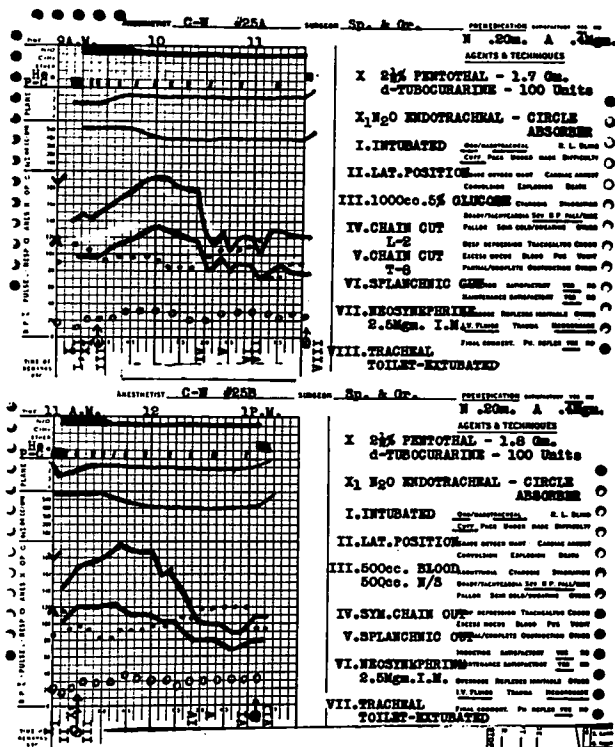


FIG. 1.

total is used sparingly near the end of the operation, rapid recovery of the patient can be expected.

The introduction of d-tubocurarine chloride which is compatible with 2.5 per cent aqueous solution of pentothal has made coincidental administration of these agents easier. Baird (3) has discussed this combination. A mixture of 100 units of d-tubocurarine chloride with 40 cc. of 2.5 per cent pentothal solution has been used successfully in our more recent cases. It has been interesting to observe that tubocurarine apparently smooths out pentothal anesthesia, and from the viewpoint of autonomic stimulation the mixture may be more desirable.

A graphic anesthetic record (fig. 1) of both stages of a typical case is shown to depict the technic employed and the blood pressure changes which occur. We have interpreted the increasing blood pressure level during the early part of the operation as the result of lightening of the anesthetic level. It must be remembered, however, that during this stage there is direct stimulation of the intact sympathetic chain, and increased production of epinephrine could possibly result. It will be noted that the second stage of the thoracolumbar sympathectomy presents the more drastic changes. For this reason blood transfusion has been given during this procedure, and vasopressors have occasionally been administered. It is now our feeling that it is rarely necessary to give vasoconstrictors as the patient will readjust of his own accord.

REPORT OF CASES

It is not possible to draw definite conclusions from a small series of 50 anesthetic procedures on 26 patients. There were 16 females and 10 males in this series. The average age was 39.6 years. The usual preoperative medication was, neimbutal 0.2 gm. given two hours before operation and atropine 0.4 mg. given one hour before operation. The prone position was used during the first twenty-four operations and the lateral position for the last twenty-six procedures. The average operating time was one hour and forty-six minutes. The closest interval between first and second stages was one week, the usual interval was one month.

The average amount of pentothal used was 1.75 Gm.; the average dose of curare was 74 units. It has been our custom to give 1000 cc. of 5 per cent glucose in distilled water during the first stage, and 500 cc. of blood and 500 cc. of normal saline solution during the second stage. Vasopressors were administered during thirty-one anesthetics. They were given eleven times during the first stage and twenty times during the second stage. Summary of the blood pressure changes is given in table 1.

There were two serious complications in this series; radial nerve paralysis and coronary occlusion. The radial nerve paralysis was noted on the first postoperative day. It followed the first stage operation on the left side and occurred in the right arm. As this patient

was in the prone position with her arms extended upward during the operation, the explanation is unknown. The paralysis has cleared after six months. This patient's blood pressure has remained near normal limits and no second stage operation has been done. The coronary occlusion occurred in a 47-year-old woman on the fifth post-operative day following the first stage procedure. It was severe in nature, but the patient has survived for eight months. Her blood pressure has remained at a lower level, but this could well be the result of the occlusion. No second stage has been performed on this patient. All 26 patients survived their hospitalization, but one patient died eighteen months later due to a cerebral hemorrhage.

Of the less severe complications, pneumothorax has occurred during operation eleven times out of 50 procedures. Tension pneumothorax developed in 1 patient which was relieved by aspiration of 1000 cc. of air. In this case, pneumothorax was not known to exist until the wound was closed and the endotracheal tube was removed.

TABLE 1

SUMMARY OF BLOOD PRESSURE CHANGES DURING OPERATION

Average systolic blood pressure after sedation for first stage	184 mm.
Average diastolic blood pressure after sedation for first stage	117 mm.
Average fall in systolic blood pressure during first stage	66 mm.
Average fall in diastolic blood pressure during first stage	31 mm.
Average systolic blood pressure at end of first stage	148 mm.
Average diastolic blood pressure at end of first stage	101 mm.
Average systolic blood pressure after sedation for second stage	172 mm.
Average diastolic blood pressure after sedation for second stage	112 mm.
Average fall in systolic blood pressure during second stage	73 mm.
Average fall in diastolic blood pressure during second stage	38 mm.
Average systolic blood pressure at end of second stage	129 mm.
Average diastolic blood pressure at end of second stage	92 mm.

Vasopressors were administered during 31 anesthetics: during first stage 11 times; during second stage 20 times.

It was manifested by dyspnea and cyanosis. It has been the practice to aspirate by intrapleural catheter in all instances of known pneumothorax. One patient developed pleurisy with pleural thickening, but no demonstrable fluid. One patient stated that she was sensitive to all barbiturates, and this was substantiated by her family physician. She was given demerol, 100 mg., and atropine, 0.4 mg. as premedication and nitrous oxide-ether was used during the operation. Her operative and postoperative course was uneventful.

SUMMARY AND CONCLUSIONS

The importance of the consideration of autonomic instability of patients with essential hypertension to be anesthetized for thoracolumbar sympathectomy has been stressed. The choice of anesthesia has been based on physiologic and pharmacologic grounds. A series

of fifty anesthetic procedures on 26 patients has been summarized and complications presented. It is concluded that pentothal-curare-nitrous oxide endotracheal anesthesia is satisfactory for these patients.

I wish to express my appreciation to Dr. Milton Davis, Jr. of the Department of Anesthesia, University of Louisville Medical School, for his helpful criticism, both scientific and literary, in the preparation of this paper.

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2. Phelps, L., and Burdick, D. L.: Anesthetic Management of Patients Undergoing Sympathectomy for Hypertension, *Anesthesiology* 4: 361-371 (July) 1943.
3. Baird, J. W.: Pentothal-Curare Mixture, *Anesthesiology* 8: 75-79 (Jan.) 1947.

NEW ENGLAND SOCIETY OF ANESTHESIOLOGISTS

The final meeting of the year of The New England Society of Anesthesiologists will be held on Tuesday, June 13, 1950, at 7:30 P.M. in the Amphitheatre, Building A, Boston University Medical School, 80 East Concord St., Boston, Mass.

The Business Meeting will be devoted to the Annual Meeting and Election of Officers.

The speakers and subject of the Scientific Meeting will be:

"A SYMPOSIUM ON ANESTHESIA FOR OCULAR SURGERY"

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Paul A. Chandler, M.D., Associate Clinical Professor in Ophthalmology, Harvard University, Senior Surgeon, Massachusetts Eye and Ear Infirmary

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