

NEMBUTAL * IN THE FENESTRATION OPERATION † ‡

HAROLD CARRON, M.D.

Tampa, Florida

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THE combination of basal narcosis with intravenous pentobarbital sodium * and nitrous oxide analgesia for the fenestration operation for otosclerosis has been utilized in an attempt to eliminate the hazards attendant upon heavy premedication and to shorten the recovery period following endaural surgery. By combining the hypnotic effects of intravenous pentobarbital sodium with the analgesic effects of endotracheal nitrous oxide, a minimum of both drugs is required. All the advantages of inhalation anesthesia are thus obtained and the disadvantages of heavy basal premedication are eliminated, permitting more physiologic control of the depth of anesthesia. Nausea and vomiting are decreased and recovery is more rapid than when heavy premedication is employed. The use of these rapidly eliminated agents obviates postoperative respiratory and circulatory depression and decreases the incidence of postanesthetic complications.

HISTORY

Lempert (1) in 1938, first made use of heavy premedication in endaural surgery using neonal, nembutal and morphine combined with local anesthetic agents in order to keep bleeding at a minimum and to obtain the cooperation of the patient at the time of fenestration. Since that time, however, it has been the observation of most surgeons performing this surgical procedure that local anesthesia did not necessarily reduce bleeding and that the cooperation of the patient is not required for the success of the procedure.

Flagg (2) in 1946, cited the hazards of heavy premedication as a substitute for general anesthesia and elaborated upon the increased bleeding produced by respiratory obstruction and spasm, straining from periosteal pain and vomiting. He advocated the use of gas-oxygen-ether carried on by the oral-endotracheal technic without carbon-dioxide absorption.

Whitaker, Juers and Shambaugh (3), in 1947, recommended the use of nerve block anesthesia in combination with heavy sedation in order

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† From the Department of Anesthesia, Tampa Municipal Hospital, Tampa, Florida.

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to increase the patient's comfort, prolong the anesthesia and decrease the amount of local infiltration required.

Hershey and Jones (4) in the same year, best outlined the anesthetic requirements for the fenestration operation. These requirements included: a minimum of bleeding, a noninflammable anesthetic agent, the avoidance of straining, the maintenance of light anesthesia and rapid recovery from the anesthetic. They attempted to achieve these results with basal avertin narcosis in doses of 80 to 90 mg. per kilogram, followed by 50 to 75 per cent nitrous oxide administered by face mask.

In 1948, Meals (5) described the use of basal narcosis with heavy doses of morphine and barbiturates supplemented with sodium pentothal and oxygen.

As previously described by Carron, Stoelting and Cullen (6) in 1948, it had been observed that patients given pentobarbital sodium intravenously manifested a period of deep narcosis for fifteen to thirty minutes during which time they failed to respond to painful stimuli. Gruber (7), in reporting on variations in activity of the barbiturates and thiobarbiturates, indicated that coughing, hiccuping and laryngospasm did not occur as frequently following the administration of thiobarbiturates as they did following the use of the nonsulfurated barbiturates.

The advantages obtained in an earlier study on the use of intravenous pentobarbital sodium (6), namely, rapid induction of anesthesia, lack of laryngospasm and ease of intubation, absence of explosive hazard and rapid recovery from anesthesia, prompted the application of this drug to anesthesia for the fenestration operation.

The preparation of pentobarbital sodium used is a stock 5 per cent solution in 100 cc. rubber stoppered vials with 10 per cent alcohol and 20 per cent propylene glycol added as preservatives and stabilizing agents.

TECHNIC

The following technic has been successfully employed on 120 patients on whom the fenestration operation was performed by two otologists and on an additional 127 patients for all types of surgical procedures about the head and neck. The patients are premedicated with morphine in doses ranging from 8 to 16 mg. ($\frac{1}{8}$ to $\frac{1}{4}$ grain) and scopolamine in doses of 0.3 to 0.6 mg. ($\frac{1}{200}$ to $\frac{1}{100}$ grain) one and one-half hours before operation. On arrival at the operating theater, the nostril opposite the ear to be fenestrated and the pharynx are anesthetized with 2 to 4 cc. of 10 per cent cocaine with an atomizer. Pentobarbital sodium in 5 per cent solution is then slowly administered intravenously in fractional doses to the point where the eyelid reflex is lost and the patient fails to respond to questioning. Endotracheally intubation is performed by the "blind" nasal route and connection is made to the gas machine. Fifty to sixty per cent nitrous oxide is delivered by the semiclosed circle absorption technic in order to prevent carbon dioxide accumulation with its consequent elevation of blood pressure and increase in bleeding.

Intravenous sodium pentothal is used in small doses as required at the time of the initial endaural incision and at the time of preparation of the flap to prevent reflex response to stimulation. When sufficient time has elapsed for the establishment of nitrous oxide analgesia between the commencement of the anesthesia and the start of the surgical procedure, pentothal is usually not required.

The pertinent statistics in this series of fenestrations are listed in table 1.

With the endotracheal tube taped firmly in place, the patient may be completely draped, for the endotracheal technic provides virtual absence of concern over respiratory obstruction. The anesthetic machine and the anesthetist may then be completely removed from the field of operation. No attempt is made to pack the pharynx since heavy draping and delivery of gases in sufficient volume prevent dilution of the gases with room air. Inadvertent stimulation of the facial nerve may

TABLE 1

	High	Low	Average
Age	60 years	11 years	35.9 years
Anesthesia time	320 minutes	50 minutes	133.0 minutes
Morphine	16 mg.	8 mg.	11 mg.
Pentobarbital sodium	300 mg.	150 mg.	198 mg.
Pentothal sodium	750 mg.	0 (27 cases)	209 mg.

be observed when requested by the surgeon by placing the hand on the patient's face beneath the drapes.

Upon completion of operation, the endotracheal tube is removed following tracheal and pharyngeal suction. Return of laryngeal and pharyngeal reflexes is immediate in all cases and many patients respond to questioning as soon as the tube is withdrawn.

COMMENT

Blood pressure determinations before and immediately after the intravenous administration of pentobarbital sodium showed an average depression of 20 mm. of mercury systolic and 10 mm. of mercury diastolic with a gradual rise to preanesthetic level in from fifteen to twenty-five minutes. In this series, however, there were no cases of prolonged narcosis, no postoperative respiratory or circulatory depression, and no serious consequence of intubation. In no case was it necessary to postpone operation because of difficulty with the anesthesia and there have been no pulmonary complications. In three instances of transient hoarseness resulted owing to difficulty in "blind" intubation, but on indirect visualization of the larynx fourteen days after operation no evidence of damage of the vocal cords was apparent in any of the 3 cases. The incidence of postoperative nausea and vomiting has been reduced

both in frequency and duration and in more than 60 per cent of patients emesis has not occurred. Five hardy patients ate a full diet the evening of operation. Fluids were allowed (and usually retained) as soon as reaction was apparent and only 15 per cent of patients have required intravenous fluids. The patients were usually out of bed on the first or second postoperative day and several were given bathroom privileges the day of operation. Vertigo and tinnitus were much less than in patients who had received heavy premedication and local infiltration.

The only complication of any significance in this entire series was the development of venous thrombosis at the site of injection of the pentobarbital sodium. In 55 per cent of cases, a hard, slightly tender area, approximately 1 inch in length, developed in the vein on the first postoperative day. Seventy-eight per cent of the patients complained of a burning sensation along the course of the vein to the axilla during the administration of the drug. Controls were given freshly prepared saline solutions of the powdered drug in the same concentration as the stock solution, and thromboses did not develop. This study has led us to conclude that either of the stabilizing agents may be responsible for this venous phenomena. These difficulties have now been obviated

TABLE 2

Bleeding	Local Anesthesia, per cent	General Anesthesia, per cent
Minimal	58	78
Annoying	35	21
Severe	7	1

either by the use of a 4 to 1 dilution with normal saline solution or by the use of the powdered form of nembutal put into fresh solution with distilled water. Consequently, the nembutal as packaged is no longer directly used as such with these stabilizing agents in their present concentration.

In table 2 are listed statistics of one otologist on the severity of bleeding when the fenestration operation was performed under general anesthesia as herein described as compared with a previous series in which operation was performed under local anesthesia with heavy basal premedication.

The advantages of the technic described include: avoidance of heavy premedication, rapid and pleasant induction of anesthesia, maintenance of anesthesia at the analgesic level, insurance against respiratory obstruction and straining, use of a noninflammable anesthetic, decreased bleeding from the operative site, rapid and pleasant recovery from anesthesia, decrease in vertigo, nausea, vomiting and tinnitus, and freedom for the surgeon from annoying interruptions attendant upon local anesthesia.

Although the subject of this discussion has been the use of intravenous pentobarbital sodium in the fenestration operation for otosclerosis, yet a few remarks on its use as a basal hypnotic agent in other proce-

dures would appear to be in order. Emergency procedures requiring endotracheal intubation when it is not safe or expedient to subject the patient to anesthesia sufficiently deep for oral intubation are facilitated through the use of this technic. This includes cases of multiple facial and jaw fractures, ankylosis of the jaw and acute head injuries in which evidence of severe cortical irritation is present. Cases of elevation of depressed skull fractures, debridement of brain injuries and evacuation of subdural hematomas are easily handled with nitrous oxide analgesia following nasotracheal intubation after the administration of relatively small doses (75 to 150 mg.) of pentobarbital sodium without other premedication. No increase in intracranial pressure or cerebral edema has been observed with the use of this drug.

SUMMARY

The combined use of pentobarbital sodium narcosis and nitrous oxide analgesia for the fenestration operation is described and discussed. The advantages are enumerated. This technic serves as a valuable adjuvant to the surgical procedure.

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