

# ETHYL-NORMAL-PROPYL ETHER: A SATISFACTORY GENERAL ANESTHETIC AGENT FOR INTRANASAL SURGERY \* †

HAROLD R. GRIFFITH, M.D., AND ENID JOHNSON MACLEOD, M.D.

*Montreal, Canada*

Received for publication November 20, 1946

CONGESTION of the nasal mucous membrane and excessive bleeding are the usual accompaniments of general anesthesia for intranasal surgical procedures. For this reason otolaryngologists have preferred to work with local anesthetic agents. Everyone will agree, however, that for some patients general anesthesia would be preferable if these unsatisfactory features could be eliminated. This is a preliminary report of our experience with a general anesthetic agent, ethyl-n-propyl ether, which appears to be safe and satisfactory for operations on the nasal passages and sinuses. For some reason which we do not attempt to explain, there seems to be less congestion and bleeding with this agent than with any other we have tried, and the operative conditions for the surgeon approximate those obtainable with local anesthesia.

In 1939, W. Easson Brown, of Toronto, reported (1) the first pharmacologic and clinical study of ethyl-n-propyl ether. It appeared to be harmless to laboratory animals when administered in anesthetic concentrations of 4 to 5 per cent in oxygen, and had no bad effect when inhaled to anesthetic level by himself. A year later Brown and Lucas reported (2) the administration of ethyl-n-propyl ether to 50 human patients for various operative procedures. They found that the agent was about twice as potent as diethyl ether, that it was not irritating or toxic, and that it might be used safely. They were disappointed to find, however, that under certain circumstances it could be exploded, and since it had been hoped that this would prove to be a non-explosive anesthetic agent, Brown lost interest in ethyl-n-propyl ether and has done no further work with it.

In 1940, Dr. Brown sent us some of the new ether for experimental study. We used it in a few cases and had just about come to the conclusion that it had no special advantage over diethyl ether when we happened to use it endotracheally for a case of submucous resection

\* From the Departments of Anesthesia, McGill University, and Homoeopathic Hospital, Montreal, Canada.

† We are indebted to Parke Davis and Company for the experimental supplies furnished to Dr. Brown and us, and we hope that they or others may again take up its manufacture in the near future.

of the nasal septum. The surgeon was so struck with the absence of congestion of the nasal mucosa that we tried it again in the next similar case, with equally satisfactory results. We then kept what small supplies of the drug we had for septum and sinus cases, and Dr. Brown let us have all of his remaining supply. We have thus been able to use it in 25 cases, with results as outlined in table 1.

The number of cases is small, but we feel that the results obtained are so uniform that the effect on bleeding and congestion cannot be just a coincidence. Six different surgeons performed the operations and all were of the same opinion. For the last three years we have not been able to obtain any ethyl-n-propyl ether, and for patients who required general anesthesia for intranasal surgery we have had to use cyclopropane, nitrous oxide, ethylene or diethyl ether. A striking difference is observed in the operative conditions, and the surgeons are asking for the "new ether."

Ethyl-n-propyl ether is a liquid at ordinary temperature and pressure. It boils at 63.6 C. and has a specific gravity of 0.75. It has a characteristic but not unpleasant odor. It can be administered by open

TABLE 1

Case	Age, Years, and Sex	Operation	Duration in Minutes	Quantity of Anesthetic, cc.	Remarks
1	38 M	SMR* and ethmoidectomy	60	45	Very moderate bleeding. No nasal sea. Postoperative period uneventful.
2	17 M	SMR	50	50	Very little congestion. Normal recovery.
3	26 M	SMR and ethmoidectomy	70	90	Moderate bleeding and congestion. Noisy recovery. Normal post-operatively.
4	26 F	Bilateral turbinectomy and radical antrotomy	130	60	Operation started with cyclopropane; much bleeding; switched to ethyl-n-propyl ether; much less bleeding. Normal recovery.
5	22 M	SMR for fractured nose	90	45	Intravenous evipal induction. Very little congestion after starting ethyl-n-propyl ether.
6	36 F	SMR, tonsillectomy and adenoidectomy	70	30	Very little bleeding. No congestion.
7	59 F	Radical antrotomy	60	75	Very little bleeding. No congestion.
8	45 F	Tonsillectomy and adenoidectomy	50	60	Moderate bleeding. No congestion.
9	14 F	SMR	90	60	Small amount of bleeding. No congestion.
10	31 F	SMR	45	30	Very moderate bleeding and congestion.
11	22 M	SMR, tonsillectomy and adenoidectomy	105	45	Considerable bleeding. Moderate congestion. Uneventful recovery.
12	43 F	SMR	90	45	Bleeding and congestion moderate. Tenacious mucus post-operatively removed by tracheal suction.

TABLE 1—Continued

Case	Age, Years, and Sex	Operation	Duration in Minutes	Quantity of Anesthetic, cc.	Remarks
13	49 M	Turbinectomy, removal of polyps, ethmoidectomy	65	45	Severe asthmatic. Moderate bleed and congestion. Recovery uneventful.
14	21 F	SMR	40	50	Very little bleeding and congestion.
15	23 F	SMR, tonsillectomy and adenoidectomy	100	45	Moderate bleeding and congestion.
16	23 F	SMR	60	45	Moderate bleeding and congestion.
17	45 F	SMR	60	45	Very little bleeding and congestion. Slight postoperative nausea and vomiting.
18	31 F	SMR	120	45	No congestion. Very little bleeding.
19	52 M	Radical antrotomy	70	45	Moderate bleeding.
20	21 M	SMR	60	40	Very little bleeding or congestion.
21	40 F	SMR and ethmoidectomy	90	60	Very small blood loss. Uneventful recovery.
22	38 F	SMR	45	30	No congestion. Very little bleeding.
23	55 M	SMR and antrotomy	75	45	Moderate bleeding. Good recovery.
24	32 M	SMR, tonsillectomy and adenoidectomy	90	45	No congestion. Cyclopropane for tonsillectomy.
25	18 M	SMR	60	35	Difficult case. No congestion. Moderate bleeding.

\* Submucous resection.

drop technic. We use cyclopropane, nitrous oxide or pentothal for induction, then gradually add ethyl-n-propyl ether to the rebreathed atmosphere. When the patient is sufficiently relaxed the endotracheal tube with inflatable cuff is introduced. The anesthetic is then continued with ethyl-n-propyl ether, using nitrous oxide and oxygen, or oxygen alone as a vehicle. By this method a little of the agent can be made to go a long way. It will be noted from our figures that there is a wide variation in the amount of anesthetic agent needed to keep patients quietly asleep. This variation depends to some extent on whether there are leaks in the circuit, but there is also a wide individual variation in patient tolerance. This is true of all anesthetic agents and particularly of the ethers. Ethyl-n-propyl ether has an effect on the patient much more like that of diethyl ether than like the gases or intravenous anesthetic agents. The patient wakes up slowly, as with ether, and the odor may be noticed on his breath for one or two days. Only one patient in our series had troublesome nausea and vomiting, however, and there was no other postoperative complication which could be attributed to the anesthetic. Epinephrine or some other vasocon-

strictor was used locally in most of these cases without any apparent effect on the pulse rate or blood pressure.

Much more pharmacologic and clinical study must be done before it can finally be determined whether ethyl-n-propyl ether is an ideal anesthetic agent for this or any other type of surgery. Our work has led us to believe that it does meet a real need of the otolaryngologist. As anesthesiology develops and the number of available agents increases there will probably be many drugs which meet just some such special surgical need. We are wondering whether ethyl-n-propyl ether might not also be useful in brain surgery because of its apparent decongestive effect. We have not used it in this type of operation, and since we have no further supplies we must wait until some more is made.

### SUMMARY

A clinical report is made on the use of ethyl-n-propyl ether as a general anesthetic agent for intranasal surgical procedures. Experience in 25 cases shows that it is apparently safe, and that it produces a remarkable absence of congestion of the nasal mucous membrane.

### REFERENCES

1. Brown, W. E.: Studies with a Newer Anaesthetic: Ethyl-N-Propyl Ether, *Canad. M. A. J.* **42**: 370-371, 1940, no. 4.
2. Brown, W. E., and Lucas, G. H. W.: Further Studies with Ethyl Normal Propyl Ether, *Canad. M. A. J.* **43**: 526 (Dec.) 1940.

*(Continued from page 600)*

4. Present Status of Anesthesiology as Practiced in an Army General Hospital. Charles H. Mitchell, M.D., and Joseph F. Peter, M.D., Augusta, Ga.
5. Function of a Pain Clinic. Donald Stubbs, M.D., and James P. Murphy, M.D., Washington, D. C.

12:15 p.m.—Luncheon—Jung Hotel.

Wednesday, February 18, 1948. 9:00 a.m.

Charity Hospital Auditorium.

1. Preliminary Report on Circulatory Studies during Anesthesia for Major Thoracic Surgery. L. H. Mousel, M.D., Washington, D. C.
2. Venous Pressure Studies during Anesthesia. Alice McNeal, M.D., Birmingham, Ala.
3. Economics of Anesthesia. L. H. Wright, M.D., New York.
4. Curare in Clinical Anesthesia. Howard Ausherman, M.D., and Frank S. Brannen, Chattanooga, Tenn.
5. Some Observations on the Effect of Anesthetics on Uterine Motility in Labor. J. P. Howard, M.D., and Vernon Balovitch, New Orleans, La.

For hotel reservations write to John Adriani, M.D., Department of Anesthesia, Charity Hospital, New Orleans, Louisiana.