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Ethyl Bromid Anesthesia in Post-Nasal
Adenoid Growths.

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ETHYL BROMID ANESTHESIA IN POST- NASAL ADENOID GROWTHS.

BY GEORGE MORGENTHAU, M.D.

The subjects of "adenoids" is such a well-worn one that I would not venture to bring it before the society, had I not been encouraged in my doubts as to the proper way of operating on these growths, by a recent discussion of this very question at a meeting of the London Laryngological Society. It appeared there, too, how wide is the diversity which exists as to the choice of the anesthetic, the posture of the patient, etc. Since conditions are different with us, especially resulting from the preference given ether over chloroform by the profession at large, and the popular distrust in which the latter drug is held; since, furthermore, this mode of operation with ethyl bromid has not been described in American literature, I am in hopes that the discussion called forth by this short paper will prove to be out of proportion to its length.

While it is held by many that anesthesia is not to be induced for this operation, I make bold to consider it both cruel and immoral unnecessarily to inflict severe—and often, quite severe—pain on a nervous, terrified, struggling child. The poor little one can not accept an adult's logic; to it this manipulation is as frightful as a much larger one would be to its parent; and the latter, not infrequently, prefers to escape even the momentary pain caused by the extraction of a tooth. It further demoralizes the child, who should look upon the physician as its friend, for whom it will open its mouth when requested to do so. Children have excellent memories



for injuries and insults offered them. One little girl, for instance, was held by her father and two other men while the physician amputated the tonsils about three years ago. She can not be prevailed upon to enter that office building again, and still retains the adenoids and an abiding distrust of physicians. To use main force seems to the child's mind as convincing as the wise answer given by the proverbial eagle to the little bird protesting against being devoured, "but I am big, and you are small."

The numerous operations on the non-anesthetized child which one had opportunity to witness or perform at the Berlin Laryngological Clinic appeared unsatisfactory to me (and since then the method has been changed there). I, therefore, advise anesthesia in younger children, but operate without it in older children when there is only a hypertrophied Luschka's tonsil which can be removed *en masse*. Chloroform and ether were employed by me in a limited number of cases. The child lay either on one side, or on its back with overhanging head. Chloroform is not feared without good reason; there were nine deaths in England alone within one year in just this operation. Ether, on the other hand, is very disagreeable to both patient and operator, as it takes much longer to produce anesthesia, often causes great excitation, and increases the amount of mucus and blood to a marked extent. The severity of the after-effects, nausea and prolonged vomiting, and the undeniable dangers incidental to anesthesia with these drugs, led me to try the method I had seen practiced by Moritz Schmidt, of Frankfurt-on-the-Main. I am now able to report on a series of 100 consecutive cases in which I operated either myself or assisted Drs. Hardie and Holinger. The operation is done in the following manner: The patient's chest is first examined, as ethyl bromid should not be used in chronic heart and lung disease. Then the clothing about the chest is well loosened. I prefer to use the head mirror and reflect the light into the patient's

throat. It is advantageous to have the patient on a higher plane than the operator; the patient's chin may then be lowered upon his chest, and the blood made to run from nose and mouth. If the patient is an older and sensible child he may sit upright in a chair, with a sheet about his arms and chest. It is advisable, however, to have an assistant hold a younger child in his lap, in order to restrain it if it should struggle, and to steady the head during anesthesia. A simple mouth gag should be introduced, although it is not absolutely necessary but valuable if a spasm of the muscles of the jaw should set in, as is sometimes the case, and as it saves time. We prefer to administer the anesthetic by holding a common chloroform mask covered with oiled silk closely over mouth and nose. The quantity to be used (1-2 drachms in children; 3-4 drachms in adults) is poured at once on a little gauze or cotton in the interior of the mask; the child may struggle a little in the beginning, but as the drug has a not unpleasant odor and does not irritate the mucous membrane, it is easily and quickly reassured. Often the face becomes flushed, the pulse is increased in frequency, but does not become weak or irregular; breathing becomes slower and a little shallower. In forty to sixty seconds, breathing may be slightly stertorous, the eyes begin to wander, the uplifted arm drops to the side, the right moment for operation has come. Pupillary and conjunctival reflexes do not serve as guides. For two minutes only the patient does not feel any pain. All instruments must, therefore, be within easy reach in order to save time. The tonsillotome can be adjusted accurately and quickly under the guidance of the eye in good light (Moritz Schmidt uses the hot galvano-cautery snare); the other tonsil is amputated with a second instrument. With Gottstein's modified curved curette the adenoids are next removed, one sweep being made in the center of the vault, and a second and third one on either side. The older form of the

Gottstein knife (the instrument is bent nearly at right angles) may then be used to sweep the posterior pharyngeal wall. Finally, if on introducing the finger behind the soft palate, any remnants should be discovered they may be scraped away with the nail. By this time, the child is nearly conscious, although not experiencing any pain; it opens its eyes, looks a little dazed, and appears but little disturbed. Anesthesia, operation, and recovery thus occur in five to seven minutes. The patients are ordered to lie or sit down immediately after awakening. Most of them were able to walk alone in a few minutes. Many left the office or dispensary in fifteen to thirty minutes, usually feeling quite bright and cheerful; occasionally they complained of a slight headache. Three vomited a short time after the operation. Nausea never was very pronounced. Three patients vomited several times during the day without great nausea; in the evening they were quite happy and hungry. One very high-strung and timid girl of 10 could not, at two different times with an interval of a week, be brought under the influence of the anesthetic.

During anesthesia no alarming symptoms occurred. The pulse was generally quickened, but not reduced in strength. In four cases a spasm of the muscles of the jaw set in, notably of the masseter, which was easily overcome by pressing the spatula firmly on the tongue or behind the last molar, and thus forcing the mouth open. No vomiting occurred during anesthesia, although some had eaten but shortly before. I had seen involuntary urination and defecation occur in Germany—it is reported in adults, too—but we did not meet with a single instance. Probably we do not push anesthesia far enough for that. Twice I observed a peculiar after-effect, which is not easily explained in view of the denial of good observers that the red blood corpuscles are attacked by ethylation. The children presented a grayish, rather ghastly hue in their complexion, which did not es-

cape the attention of their mothers; and on feeling the pulse without their knowledge, I found it accelerated but strong. This state lasted two weeks without producing any discomfort whatsoever. Ethyl bromid is eliminated by the lungs only, sometimes with a garlic-like odor; no traces of free or combined bromin are found in the urine.

It is of the utmost importance that the reflexes are not abolished. The persistence of the laryngeal reflex justifies what would otherwise be a dangerous procedure, keeping the patient in the upright posture. No blood can enter the larynx without producing immediate reaction, *i. e.*, being expelled by coughing. The pieces of severed tissue either adhere to the instrument, or are swallowed or expectorated. As soon as the vault has been cleared, the patient is ordered in a loud voice, to "spit it out." Even when consciousness has not completely returned, the command is automatically obeyed. Most of the blood escapes through the nostrils and the inclined groove formed by depressing the tongue and holding the chin downwards. When the vault is again entered, in order to palpate and scrape away any stray adenoid tissue, the patient is analgesic even if manipulation should be perceived, and recalled later on.

As far as the results of this mode of operating are concerned, we are well satisfied. Recurrence took place in only one case, where Dr. Holinger yielded to the entreaties of the mother to operate on her daughter three times within six months. The parent declared that her daughter always grew stupid when the growths were there. The patient was a girl of 16 who could easily be examined with the rhinoscopic mirror. Dr. Holinger could thus convince himself that none of the growths remained behind after the operations. As far as my experience with forceps goes, it is not possible to remove all the adenoids in the limited time at our disposal. Cutting, as it usually does, transversely, it has undoubtedly caused many severe hemorrhages, primary and secondary,

by nipping the posterior ends of the turbinated bodies or the posterior edge of the septum. I know of but two cases of severe secondary hemorrhage after operation with Gottstein's curette; and in one, which happened to me, I ascribe it to the fact that I removed but little at the sitting, not having anesthetized the patient, a young woman. Even that popular and vigorously grasping forceps invented by a distinguished member of this Society may in busy hands, when one of them is introduced into the nasopharynx to guide the instrument, be the cause of much unnecessary blood-shedding. The upright position enables the operator to use the Gottstein knife quickly and effectually. The instrument is so ingeniously constructed that it is impossible to do damage with it. In cases where I found great swelling of the nasal tissues, I have applied a weak solution of cocain (4 per cent). The shrinking of the tissues allows the blood to run freely through the nose. The bromid of ethyl we employed with great satisfaction is made by Merck of Darmstadt. It is sold in one ounce, sealed, dark glass tubes. In glass-stoppered vials, it is not reliable. I have found that the liquid had entirely evaporated although the original packing had not been disturbed. The most practical form would be in one-half ounce tubes, just enough for one anesthesia in an adult. It is not safe to keep an opened bottle for any length of time, because the ethyl bromid is decomposed by sunlight or in contact with air. The best preparation is obtained, according to the German pharmacopœia, by distilling a mixture of alcohol, sulphuric acid and bromid of potassium. The product is colorless, of neutral reaction, with a pleasant odor. It must not be confounded with bromid of ethylene; a most dangerous mistake to which one death must be ascribed which was charged to bromid of ethyl. The impurity of the older preparation, and its cost were reasons against its use which do not hold good to-day.

The career of the drug is a checkered one; it has had its ups and downs. It is only just, however, to say that, like the historic queen, it is better than its reputation, and is at present in great favor. Discovered by Serullas in 1827, it was first used by Nunnely, of Leeds, in 1849, and again lauded by him in 1865. He considered it one of the best of anesthetics; a view in which B. W. Richardson declared he fully concurred. In America it was introduced by Turnbull in 1877, and extensively used by Levis, of Philadelphia, Chisolm, Conner and many others. In spite of their enthusiasm based on several thousand successful cases, the reports of a few deaths, notably one by Marion Sims, and the unfavorable results of experiments made by Wood on animals, drove it into oblivion. It would lead too far to follow in detail the arguments advanced by its adherents and opponents, although the perusal of the literature bearing on the subject (*New York Medical Record*, 1880, and other journals of that year) is most fascinating to the student of medical history. In the last five years ethyl bromid has again been taken up by the profession. It is steadily gaining in favor with German laryngologists; the Berlin Clinic reported excellent results in 200 cases, agreeing in nearly every point with our experience. Moritz Schmidt speaks highly of it in his latest book. He performs all the adenoid operations in his office with this anesthetic. German dentists are using it to a great extent instead of nitrous oxid because of the appreciably longer anesthesia. Witzel (*Monatschr. Zahnheilk.*, 1891, October), for instance, after 465 trials, calls it the least dangerous anesthetic; as much devoid of danger as nitrous oxid. His experience is most valuable, as it includes patients sent from the various clinics at Marburg; among them are six with severe diseases of the heart and lungs; eleven with pulmonary disease, etc. He speaks of the anesthetics as excellent with twenty-eight exceptions. These are given under different headings:

a. Great excitation in nine cases. Of these, four with much sweating.

b. Cyanosis in two students somewhat the worse for liquor.

c. Asphyxia, but rarely with his method (first, a few drops, then the whole quantity of the anesthetic).

d. Malaise, feeling of lassitude, vomiting.

e. Urination in three cases.

f. Great sexual excitement.

But these phenomena, he asserts, will be seen with any other anesthetic. In two cases he could not produce anesthesia with one and two ounces. In six cases he anesthetized the patient twice in one sitting; in two cases, three times.

In regard to the dangers of bromid of ethyl anesthesia, there are numerous and most contradictory statements to be found in literature. I do not wish to conceal that even with the new and purified drug, fatal cases have occurred. While one (Billroth's) would have ended just as unfortunately had any other anesthetic been used because the patient's heart was diseased; while another, occurring on the day after its administration, can not positively be attributed to it; nevertheless there are three cases in which ethyl bromid can not be exonerated. Statistics are, unfortunately, not complete enough to be of value; and, furthermore, the number is not nearly great enough to allow of any definite deductions as yet. Gurlt's statistics (*Arch. Klin. Chir.*, vol. 1, 1894) place ethyl bromid between chloroform and ether.

Chloroform, 166,812 cases with 63 deaths—1.2647.

Ethyl bromid, 7,541 cases with 2 deaths—1.3770.

Ether, 26,320 cases with 2 deaths—1.13160.

These figures will certainly be modified in the next report as far as ethyl bromid is concerned, making the ratio a much more favorable one as the number of administrations increases; the Billroth case of the patient with diseased heart turning the scales most unfairly.

The discussion on this subject in the Berlin Laryngological Society (*Berl. Klin. Woch.*, No. 1, 1894) shows well how contradictory are the views held by various observers. While the essayist (Ed. Meyer), relying on 200 successful administrations, could speak highly of the lack of danger and the other good qualities of this drug, Grabower quoted the results of experiments on rabbits. He declares it to be one of the most dangerous of narcotics, if not the most dangerous one. After a few inspirations the pulse rate is greatly increased; later on arhythmia; then genuine cardiac delirium with utter lack of coördination of the different parts of the heart. In a short time the heart stops. During arhythmia there is no abnormality of respiration. Thus there is no warning of danger as with other narcotics. Others controverted the right to draw conclusions from experiments on animals in reference to the human economy.

In his "Text-book on Therapeutics," Hare draws attention to the studies made in Jefferson Laboratory, which show that the dominant action of ethyl bromid is on respiration, not on the circulatory system. Its effect is depressant, but only seen after excessive doses. Blood pressure falls under its influence to a slight degree, and the pulse is slowed through an influence probably exercised on the inhibitory nervous mechanism of the heart.

H. C. Wood, however, from a series of experiments made upon lower animals, has arrived at the opinion that it acts upon the heart in a manner similar to chloroform, although its influence is not so depressing. A more recent investigator (Brubacher) found, in experimental intoxication of rabbits and guinea pigs, that the heart always continued to beat regularly and powerfully after respiration had ceased.

Schneider, Professor of Dentistry at the University of Erlangen (*Monatschr. Zahnheilk.*, May, 1890), who uses ethyl bromid extensively in practice, made a

most searching series of experiments in the Physiological Laboratory. His deductions appear well founded, and are as follows:

While it may be admitted that under the influence of chloroform the red blood corpuscles are disintegrated, producing fatty metamorphosis, we must deny a similar action to ethyl bromid in every respect; believing that we proved by microscopic, chemic, and physical examination:

That bromid of ethyl can not produce any change whatsoever in the red blood corpuscles.

That bromid of ethyl, on account of its lower boiling point, is very rapidly eliminated from the body by the lungs.

We, and with us most of the authors, have observed that even in deepest bromid of ethyl narcoses, the pupils are hardly contracted. This proves that these vapors have not an energetically paralyzing influence on the medulla, because the narcosis is reduced to a previous stage by the rapid elimination of these vapors by the lungs. It was demonstrated, moreover, by the hemodynamometer that the blood pressure always suffices for an exchange of gases; and, finally, the sphygmographic curves, of which the author made a great number, show hardly any change in the pulse tracings. This proves that contraction of the muscles of the vessels takes place while most chloroform tracings show paralysis of the vasomotors. There is a slight diminution of the blood pressure from reduced innervation. That is to say, cardiac alterations are much less than in chloroform narcosis. With at least as much right as it is maintained of ether, bromid of ethyl has only a slight depressant action on the heart; and death from ether results from paralysis of the respiratory center. When ethyl bromid was administered to animals in fatal doses respiration stopped much sooner than the heart, which continued to beat regularly and vigorously after respiration had ceased.

After all, laboratory and animal experiments do

not seem to bring us much nearer to a universally acceptable solution of these questions. The long and bitter fight between chloroform and ether partisans is still raging. Until we have an absolutely safe anesthetic, if that is possible, we must content ourselves to run risks. Even if ethyl bromid should prove to be more dangerous than ether, the incomparably shorter duration of anesthesia would outweigh the apparently greater security of etherization. It is a question which must be decided by many thousands of clinical experiments, as it were. The opposing views have been presented impartially, without allowing my gratitude for the time and trouble saved by the use of this anesthetic to blind my judgment. The manifold and obvious advantages of this mode of operation will, I may trust, recommend it to many as well worthy of extended trial.

Venetian Building.

