

The origin of the dorsal arteries is irregular. Vessel wall is thin and highly elastic, the intima showing slight fatty metamorphosis.

Groin.—The mass in left inguinal region is as big as a turkey egg, consisting of irregular nodes, black in color, and rests on the Sartorius muscle, Poupart's ligament and the structures between forming the floor of Scarpa's triangle. The branches of lumbar plexus which pass under Poupart's ligament are uninvolved in greater part by the growth.

Spinal Cord.—Lower portion, dorsal region, are found, lying posterior to cord on dura mater, several flattened, rounded tumors, varying in size from a buckshot to a medium-sized hazel nut.

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 Norris and Oliver: *System of Diseases of the Eye*.

DISCUSSION.

DR. EDWARD JACKSON, Denver—I would like to ask Dr. Wiener if he got the history at all.

DR. WIENER—I did not get any history from the patient and did not see the case until the patient was dead. I only reported the case because of its rarity. The growth probably started in the mediastinum and it seems to correspond in many ways with the case reported by Dr. de Schweinitz.

ONE THOUSAND PERSONALLY CONDUCTED CASES OF ETHYL CHLORID NARCOSIS.*

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After an anesthetic has been demonstrated to be effective, the next absorbing and vital question is its safety. On this score the brute force alone of numbers is telling, and I hope, therefore, in this narrative, to carry conviction in this direction on the basis of one thousand personally conducted narcoses with ethyl chlorid, and some collected statistics. These thousand narcoses were all conducted with ethyl chlorid sold under the trade name of "Kelene" and a mask of my own devising, described in previous communications.¹ For the present I must insist on the use of the above variety of ethyl chlorid, since other preparations marketed in this country, ordinarily intended for local anesthesia by freezing, are impure, containing methyl chlorid to facilitate evaporation. Furthermore, it happens that the above mentioned preparation of ethyl chlorid is the only one thus far provided with a suitable automatic cutoff to control the escape of ethyl chlorid, which issues from the vial in a very large stream. A number of masks described in foreign literature are not only ineffective but very costly. This simple, inexpensive device covers all requirements. The rubber cone makes an air-tight space about the nose and mouth; on to the gauze surface the ethyl chlorid is sprayed, the stream being released intermittently, from a distance of six to eight inches. Other details have been described in previous articles, and I would, therefore, limit my remarks to answering such criticisms as have come to my notice.

Does success attend its use in every instance? No more nor less than can be said of the other anesthetics. We estimate that in 95 per cent. an absolutely satisfactory anesthesia was obtained. This anesthesia sets in

promptly, at intervals of a few seconds in infants to three minutes in adults, and the awakening is equally as prompt. During the narcosis the color is natural and there is tolerable relaxation of the muscles. The giving of the anesthetic is controlled by the same criteria that hold good for other anesthetics. Mention is made in one of my previous writings of a layer of "hoar frost," resulting from the combination of the vapor of the breath with the ethyl chlorid, which forms on the gauze. I have now learned to regard this rather as a favorable than a deterrent factor, provided the frost be not allowed to form in too thick a layer so as to intercept all access of air. This "hoar frost" constitutes a storage depot for much of the ethyl chlorid and thereby facilitates narcosis. If a mask so saturated with this layer of "hoar frost" be applied to one's own face as for purposes of inhalation, no chilling of the inspired air will be perceptible, but a decided odor of a very pleasant nature is appreciated, and if the application of the mask be persisted in a little longer a sense of dizziness overcomes one. No untoward experience has resulted from the inspiration of air chilled in its passage over the frost, since the vapor of ethyl chlorid is dispelled, expanded and warmed in the pharynx before being taken up in the lungs.

Most of the observers advise spraying the ethyl chlorid in the various devices employed, in great quantity at once. This is unnecessary and likely to be dangerous. Perfect safety and great economy are insured by spraying intermittently. To guard against an interruption of the anesthesia by temporary occlusion of the capillary opening in the vial, an additional tube should be kept at hand. The stream must at all times issue in full force, since a dribbling stream will be attended by failure.

Children and young adults constituted about 75 per cent. of the instances in which this anesthetic was applied, and it has been remarked that the brilliant results witnessed were obtainable with all anesthetics in children. This is not the case. In the first place, the onset of the anesthesia is more rapid than with the other agents, and then the hasty awakening and remaining so from an immediately preceding profound narcosis is peculiar to none of the other anesthetics. For ambulatory practice this feature is only rivaled by laughing gas. Relaxation of all muscles is manifested in the state of profound narcosis; it is seen at its best up to adolescence, thereafter more or less rigidity is at times encountered. This is more so apt to follow when the reflexes are heightened in the inflammatory conditions demanding operation. In old age this anesthetic again operates as in infants, thus a successful reduction of a dislocation of the shoulder of long standing was effected thereby in a woman 80 years of age. To overcome the objectionable rigidity, I have in a number of instances administered morphin sulphate, gr. $\frac{1}{4}$, as a preliminary. In proportion as the patient is addicted to alcohol, ethyl chlorid will cease to act favorably, wherefore in outspoken alcoholics a preliminary use of morphin hypodermically will insure a good anesthesia. Adults can be sufficiently anesthetized to do any minor operation of well-defined limits, but often at the expense of ethyl chlorid in large quantities.

Up to this point laughing gas is a strong competitor, but as cyanosis is never encountered with ethyl chlorid the latter takes the lead, also outstripping nitrous oxid on the score of portability and the cost of application. As the field of ethyl chlorid is only for minor operations, it must be pitted against nitrous oxid. The latter

* Read at the Fifty-third Annual Meeting of the American Medical Association, in the Section on Surgery and Anatomy, and approved for publication by the Executive Committee: Drs. H. O. Walker, A. J. Ochsner and DeForest Willard.

1. Medical Record, April 6, 1901; Medical News, Aug. 3, 1901.

has the greatest record statistically for safety, its death rate being placed at 2 in 1,500,000.² For ethyl chlorid, I am able thus far, conjointly with my own 1,000 cases, to present you a record of 12,436 with but one bona fide proven death, forthwith to be narrated.³

A day laborer, 41 years of age, muscular, alcoholic, extensive ulcer of the leg. A transplantation operation was contemplated. Kelene narcosis for two minutes; extensive excitation; more kelene injected on the mask after three minutes. The blood being dark the mask was removed; cornea and pupil reflexes abolished; defensive motions with extremities; rigidity of the jaws; spasmodic breathing; cyanosis. Pulse was perceptible but not countable owing to the rigidity of the muscles; then followed an intermission of the pulse and death. The succession of events was instantaneous, the whole interval of time comprising three minutes. Five grains of ethyl chlorid were used. Artificial respiration was kept up one hour, camphorated oil injections were used, patient placed in the Trendelenburg position, cardiac massage, galvanism of the phrenics, all of no avail.

Postmortem.—Eccentric hypertrophy of the heart; fatty degeneration of the cardiac muscle; extensive arteriosclerosis of the coronary arteries; sclerosis of the aorta in moderate degree. Blood in the heart and veins of a cherry-red color, fluid, but not coagulated. The blood recalls poisoning by coal gas. No ecchymosis in the pericardium or pleura; no edema of the lungs. The absence of ecchymosis is noteworthy, hence no asphyxia can be charged. Extensive arteriosclerosis of the coronary arteries was assigned as the cause of death.

Lotheisen advises using but three grams at once and then to spray one gram of ethyl chlorid per minute until two grams are given. If marked excitation and cyanosis occur they demand the removal of the mask.

The details of another published death⁴ wrongly attributed to ethyl chlorid, I must needs bring to your notice. The consultant physician's statement is as follows:

A female, 55 years of age, kypho-scoliotic, came for the extraction of lower molars to her dentist. She was at times subject to cardiac derangement and within the year had suffered from a fracture of the rib and later from an attack of left hemiplegia. I had not seen her for one year until the message came that the patient was unconscious after a tooth extraction. I found the patient unconscious, automatic reflexes, absent corneal reflex, pupils contracted, jaw hanging, tongue not retracted, but limp; respiration intermittent, at intervals of two to three seconds two or three respirations, and at times deep sighs; expiration very slight; then another interval followed by the same type of respiration. Pulse 84, regular. The heart sounds clear; lungs free from disturbance; temperature 36.2 C. Color of the skin not blue, rather bright red cheeks. No odor emitted from the mouth; no vomiting; no incontinence. Flagellation and all else does not rouse her. Attempts at artificial respiration were of no avail; camphor and ether injections to the number of eight were ineffective.

The dentist's narrative reads thus:

The fear not unusual with a patient approaching the dentist's chair manifested itself in our patient. At 10 A. M., after drying the gums, moistening them with glycerin and guarding against the unnecessary inhalation of ethyl chlorid by covering the middle and index finger with a napkin and surrounding the lower teeth to be extracted, I sprayed the ethyl chlorid, at a distance of 35 cm., on the gums until they were blanched. Extraction required about twenty seconds, and two grams of ethyl chlorid were used. Following subsequent rinsing of the mouth, her head suddenly dropped, jaw sank, the face became pale and the eyes were dull and fixed. The pulse was weak. I exercised traction on the tongue, practiced artificial respiration, and provided for the access of fresh air. All this I kept up until 3 p. m. Until 10 o'clock at night

this collapsed condition continued, the pulse gradually weakened and accelerated up to 110; the respirations were 24. At 2:30 the next morning death set in. This was no asphyxia, but a suspension of consciousness and then a paralysis of respiration; finally terminating in cardiac paralysis. After the use of ethyl chlorid narcosis promptly set in, and so quickly were the cerebral functions in abeyance that the cortical centers and medulla became paralyzed. After fourteen hours death supervened.

This case of death attendant on the use of ethyl chlorid I can not let pass unchallenged. In the first place, ethyl chlorid was not used as advocated for narcosis. It was sprayed into the oral cavity in concentration. In the second place, the patient had one year ago experienced an apoplectic stroke, she was scoliotic and had compensatory changes traceable to cardiac insufficiency. Syncope set in immediately following the extraction. Similar phenomena are experienced in the first stages of chloroform and ether operations, particularly in operations conducted about the head and neck. Death under such circumstances has always been put down to reflex inhibitory action on the heart exerted through the vagi. In this fatal case of Seitz' death did not set in until fourteen hours later. Ethyl chlorid is too fugacious and too quickly eliminated to act thus long upon the system. From the vivid word picture of the patient's condition (note the description of Cheyne-Stokes' respiration) it is not far fetched to gain the impression of a possible apoplectic stroke perhaps due to embolism from the heart. Finally, the cause of death was not proven postmortem.

In Kocher's clinic there is mention, *en passant*, of a death under ethyl chlorid, but with no further detail whatsoever. It has subsequently been learned that in this instance the ethyl chlorid was not pure and not properly applied.

If these three deaths be unqualifiedly accepted, the mortality in the use of ethyl chlorid for narcosis approaches that of chloroform; if not, it stands between that of ether and gas. But we must be mindful that were all ether and chloroform deaths unstintedly reported we should have a higher mortality.

Symptoms bordering on fatality I have in my series encountered six times. In each instance they were those of respiratory interference and they occurred as the outcome of neglect of attention to the retro-placed tongue during the stage of profound narcosis, or a disregard of sufficient admixture of air. The fact that all of these patients recovered under artificial respiration speaks very favorably for ethyl chlorid. Thus Schleich⁵ found when he profoundly narcotized rabbits up to the point of respiratory paralysis with ether, chloroform and ethyl chlorid respectively, the animals succumbed to the former two, but were capable of resuscitation by artificial respiration when asphyxiated with ethyl chlorid. I have seen respiration in no wise adversely influenced, but if patients withhold from a free and easy respiration the ethyl chlorid will evaporate and not act as quickly. Such subjects as become deeply anesthetized breathe stertorously. Salivation I have never encountered.

Fritz König⁶ in animal experiments conducted on rabbits and monkeys, noted that in rabbits the respiration was accelerated and at times spasmodic. This was due to irritation of the respiratory center. In monkeys, however, this was wholly absent, and compared with ether given to apes, ethyl chlorid is far less dangerous.

3. Lotheisen—Muench. Med. Woch., 1900, No. 18, p. 601.

2. Dr. Charles M. Buchanan. Medical News, vol. lxii, April, 1893.

4. J. Seitz: Chloretethyl Tod. Corresp.bl. Schw. Aerzte, Jahrg. xxxi, 1901, No. 4, p. 97.

5. Schmerzlose Operationen. Berlin, 1894, p. 43.

6. Ueber Athylchlorid Narkose. Inaugural Dissertation. Bern, 1900.

These advantages claimed for ethyl chlorid obtain only when a due admixture of air is provided for. I have used ethyl chlorid with the labored respiration accompanying operations for empyema in three instances and I can pronounce it an ideal agent for this purpose. In retropharyngeal abscess with difficult respiration, it has also admirably stood the test in some twenty instances.

Some of the unpleasant experiences recounted were traceable to infants in whom we could subsequently make out the existence of the status lymphaticus (enlarged tonsils, enlarged adenoids and retropharyngeal lymph glands). We must not, however, jump at the conclusion that ethyl chlorid should not be used, therefore, in operations for adenoids, since the presence of the status lymphaticus once assumed would forbid the use of any anesthetic. Those who operate adenoids quickly and who would take advantage of the expiratory efforts in the awakening to expel the blood, will see the advantage of this over nitrous oxid anesthesia with its invariably accompanying cyanosis and rigid jaw, and its superiority over a primary superficial narcosis with ether with its drawbacks of persistence of odor and prolonged nausea.

Even when given on an empty stomach, ethyl chlorid in a very small number of cases produces vomiting and nausea, but these are of the briefest duration when they do occur. Twitching and convulsive movements I have occasionally noticed during the anesthesia. Under these circumstances one must proceed cautiously in pushing the anesthesia. Of course these interfere with the finer manipulations of an elaborate operation; thus, decision of a cataract was performed with difficulty by a colleague owing to the rotary nystagmus of the eyeballs, though the anesthesia was perfect in every other respect.

A very few times the awakening has been accompanied by an excitement bordering on slight delirium, but of a very evanescent character. As a rule, it is phenomenal to witness time after time how naturally the patients come to and put questions. As for infants and children, the prompt and lusty cry after a previous profound narcosis is a source of great rejoicing to the parents, who welcome this sound with the same intense anxiety that they do the first cry of the new-born.

The pulse was always slightly accelerated with no alteration of its tension.

Very trustworthy and valuable experiments are again reported by Fritz König (*loc. cit.*) as to the influence of ethyl chlorid on blood pressure. He tested it on four rabbits and four monkeys, having provided for a free access of the proper amount of air by the employment of artificial respiration. His conclusions are as follows:

1. Ethyl chlorid administered with a due admixture of air effects no diminution of the arterial pressure, yet the narcosis is complete.

2. In individual instances there is a fall of blood pressure, due to vagus irritation. After section of the vagi the blood pressure rises and remains at its height throughout the narcosis.

3. When no due admixture of air is provided for, a lethal depression of the blood pressure and coincident respiratory paralysis follow. This holds good merely for the rabbit, the monkeys being far more resistant.

To effect a primary narcosis prior to the administration of ether or chloroform, ethyl chlorid is applicable in a like manner as laughing gas. It does not in the least act antagonistically or unfavorably towards accomplishing this.

As to the length of time during which it is applicable I see no reason why, if it operates well for fifteen minutes, it should not hold good for a greater length of time, in proof of which I can attest to its efficiency, having used it in an infant of 8 months for fifty minutes, the operation being for strangulated hernia; in a young lady of 18 for forty minutes in an operation for ganglia of the wrist, and in a woman of 75 for amputation of the metacarpal phalangeal articulation for tubercular arthritis, during a period of forty-five minutes. The item of expense strongly militates against its use in prolonged operations, as does also the readiness with which patients enliven and become rigid as soon as one desists in the administration because of the existing profound narcosis.

The present standpoint of ethyl chlorid narcosis may thus be summarized:

It is relatively a safe anesthetic.

Its danger point is not as readily nor as suddenly reached as in chloroform, nor does it carry with it the remoter dangers of ether.

Asphyxia when encountered is easily remedied by artificial respiration.

Proficiency in the giving of ethyl chlorid requires experience akin to that in the use of other anesthetics. The speedy onset of the anesthesia and the prompt recovery from it stamp it as ideal for ambulatory practice where it must in time usurp the preëminence of laughing gas. No physician of experience can say the least thing derogatory to the safety of laughing gas with its record of two deaths in 500,000 (?), but if you ask the physician wherefore he does not practice what is gospel in regard to laughing gas, the invariable reply is that even at its best the apparatus is too cumbersome and expensive and beyond control to estimate the quantity of gas at hand; furthermore, he will tell you the patients are always cyanotic and rigid. All these objections are at once overcome with ethyl chlorid. Surely, if every dentist is ready to use laughing gas to spare his patients pain in extraction with a minimum of unpleasant after-effects, why should not this be the attitude of the humane physician whenever he has recourse to the knife for the various acute and painful surgical affections.

In the mortality statistics given for nitrous oxid⁷ cognizance is taken of all the dental administrations. Were we also to include these, we should be able to say, not that the present mortality were 1 in 12,476 for ethyl chlorid, but 1 in 15,000 approximately. Again, the deaths from all causes to date under nitrous oxid are put down at 30 (*loc. cit.*); of these nearly one-half occurred within the last ten years, whereas that same number did not take place within three decades preceding. We offer this criticism not in any hostile spirit towards nitrous oxid, but merely to emphasize once more how cautious and reserved we must be in our attitude in estimating mortality statistics for a given anesthetic.

I submit these data, trusting that they will be sufficient to guide in giving ethyl chlorid a fair trial as a general anesthetic, so that it in due time may occupy a conspicuous place among the anesthetics.

7. *Anesthetics and Their Administration*, by Frederick W. Hewitt, p. 228, Second Edition.

To Preserve Rubber.—Ten to twelve parts of water and one part of ammonia will preserve soft rubber any length of time. Dip rubber pipes, etc., in a glass jar filled with this solution. Use for your ammonia bottle a rubber stopper; it is better than a glass stopper.—*Toledo Med. and Surg. Reporter.*