

is not immune, for if brought in contact with diseased animals it also becomes diseased. Loeffler finds that it takes 240 cubic centimeters of the best serum to protect a 600-kilogram cow against the natural disease. Even this is not always successful, and when it is, immunity only lasts for fourteen days and is not lengthened by larger doses. Such immunity is no equivalent for the cost of making so much serum, especially as at the end of fourteen days the animal must be protected again in order to carry it beyond the probability of infection with the natural disease. This method has therefore been declared impracticable for cattle, and other means of protection are being sought, a number of which have been tested on more than 3,000 cows. But, as yet, Loeffler feels that nothing can be recommended.

With *sheep* and *swine* better results have been obtained. Only 5 to 20 cubic centimeters of serum (according to size of animal) is necessary to grant them an immunity which lasts three to four weeks. In practice this method has succeeded in several instances in limiting the disease to a few animals only of a herd; for these animals, therefore, it may be a useful agent to employ until some better method is discovered.

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### CHLORIDE OF ETHYL AS A GENERAL ANESTHETIC.

BY CHARLES GREENE CUMSTON, M.D., BOSTON.

CHLORIDE of ethyl ( $C_2H_5Cl$ ) is a colorless liquid, with quite a strong aromatic odor and a sweetish taste resembling that of chloroform. Its density is 0.874 at  $+5^\circ C$ . (Thénard), and 0.920 at  $0^\circ C$ . (Pierce). The density of its vapor is 2.219. It boils at  $10^\circ C$ ., and consequently evaporates very rapidly at the ordinary atmospheric temperature, and must be preserved in hermetically sealed receptacles. It is extremely combustible, and burns with a flame bordered by green, and produces hydrochloric acid.

It is formed in several manners: Firstly, by the action of hydrochloric acid on alcohol ( $C_2H_5OH + HCl = C_2H_5Cl + H_2O$ ). Secondly, by the action of perchloride of phosphorus on alcohol ( $C_2H_5OH + PCl_5 = HCl + PCl_4OC_2H_5$ ). Thirdly, from the action of a large number of chlorides on alcohol, and under these circumstances the chloride of ethyl is always mixed with the oxide of ethyl. Fourthly, by the action of chlorine on the iodide of ethyl, in which case there is simply a displacement of the iodine by the chlorine. Fifthly, by the action of hydrochloric acid on the acetate of ethyl, acetic acid becoming free. And, sixthly, by the action of chlorine on the hydrate of ethyl.

Chlorine has no action on chloride of ethyl in

darkness, and in diffused light only acts on it very slowly. If the operation is begun in the sunlight and continued in diffused light and ended again in sunlight, the following series of products are obtained, namely: Chlorinated chloride of ethyl ( $C_2H_4Cl_2$ ), bichlorinated chloride of ethyl ( $C_2H_3Cl_3$ ), trichlorinated chloride of ethyl ( $C_2H_2Cl_4$ ), quadrichlorinated chloride of ethyl ( $C_2HCl_5$ ) and, finally, perchlorinated chloride of ethyl ( $C_2Cl_6$ ) results.

These chlorine derivatives of the chloride of ethyl have been proposed as anesthetics, and in 1848 Nunnely tried the chlorinated chloride of ethyl as a general anesthetic. It was again employed by Laugenbeck, in 1870, and about ten years later it was used by Newman, Hodges and Reichert. These authorities mentioned the rapidity with which narcosis was obtained, the almost immediate return to consciousness, and the less disagreeable effects than those noticed after the use of chloroform. They also remarked that the circulation was far less depressed. Out of a total of 1,867 cases, Newman had only one death from syncope, and autopsy showed a dilated heart with fatty degeneration. Reichert believes that this anesthetic has a direct depressing action on the heart, which is still manifest after section of the pneumogastric nerve.

The isomers of chlorinated chloride of ethyl, the chloride of ethylene, the chloride of ethylidene have been employed by Kocher, Soulier and Brian. Two cases of death from these agents have been reported.

After experimental work on animals, Dubois and Panas demonstrated the bad effects of chlorinated chloride of ethyl on the cornea. Several hours after the animal had regained consciousness, an opacity of the cornea was found, occurring after the elimination of the anesthetic, and was due to a serous infiltration of the parenchyma of Descemet's membrane. The edema of the cornea, they say, is due to the destruction of this membrane, which alone protects the cornea against invasion from the vitreous humor. This opacity finally disappears, the process beginning at the periphery towards the center, and is often accompanied by hyperemia of the conjunctiva and photophobia. It has been thought advisable to mention these experiments in order to show the difference existing between chlorinated chloride of ethyl and chloride of ethyl, because during the elimination of the latter product there is complete absence of any disturbance of the eye.

Wood and Cerna came to the following results in their experiments with chloride of ethyl on the rabbit: An increase in the respiratory movements and a decrease in the arterial pressure during narcosis, with an immediate return to the normal state as soon as the anesthetic was stopped. In the first place, the pulsations diminish in frequency and then become increased until the end of the experiment.

Ruegg of Basle found that there was a dilatation of the blood vessels in the dog when the animal was submitted to the inhalation of diluted vapors of the chloride of ethyl, but when they were given in a concentrated form the heart beats became more frequent and the blood vessels contracted.

The experiments of Koenig were carried on with dogs, rabbits and monkeys. The rapidity with which narcosis is obtained depends on the amount of dilution of chloride of ethyl with air. A mixture of one part of the anesthetic and ten parts of air produces narcosis in from six to seven minutes; in equal parts narcosis is complete in a few seconds and lasts for several minutes without renewing the anesthetic. In rabbits the phenomena of motor excitability during anesthesia were more pronounced than in other animals. Rhythmical convulsions, marked movements of deglutition, nystagmus, exophthalmia and frequently abundant salivation were observed. The respiration was also accelerated. In dogs there was a slight decrease in the arterial pressure, and in one experiment there was a decrease and irregularity in the heart beats which increased or diminished with the amount of dilution or concentration of the anesthetic; but all these symptoms disappeared after the pneumogastrics were cut.

When chloride of ethyl was used without dilution with air, the arterial pressure became lowered in a regular fashion quite rapidly and becoming more and more accentuated until respiration and heart beats ceased altogether.

In the monkey the narcosis was very calm, and a depression of arterial tension was noted, due to excitation of the pneumogastric of central origin, since it disappeared after the vagus had been cut. After section the arterial pressure increased and remained normal until the end of the experiment. Koenig also noted that the pneumogastric nerves did not respond to irritation when the narcosis was complete, and no matter how many times the anesthetic was given in short intervals to the same animal the return of consciousness and reflex action were always rapid.

Koenig's experiments on the arterial depression are quite in accord with the results published by Malherbe and Roubinovich, which were observed in man by means of Potain's sphygmomanometer. In the twenty-four cases observed by these writers, arterial depression occurred in twenty-two, and, generally speaking, the number of pulse beats followed quite exactly the modifications in the degree of arterial tension, diminishing during sleep and increasing and finally attaining the normal number when consciousness had returned. In all their cases they noticed intermitting in the beats. Occasionally the urine, which was normal before the administration of the anesthetic, contained traces of albumen and bile pigments when the patient regained consciousness, which would indicate that the liver and renal cells participate in the ephemorous intoxication produced by the chloride of ethyl in a few cases; but these symptoms disappeared in a few days.

Up to within the last few years chloride of ethyl has been more especially known as a local anesthetic, and has been employed in dental and minor surgery. On account of its extreme volatility it produces an intense cold and a superficial freezing of the tissues, quite sufficient for momentarily abolishing the sensibility. In 1895 a dentist of Gothenburg, by name Carlson, unwittingly obtained a general narcosis in a patient on whom he had frozen the gum with the chloride of ethyl.

The following year, Thiesing of Nildesheim published the results of five general anesthetics with this drug. The narcotic effects of this product were studied scientifically for the first time by Ludwig and Lotheissen in von Hacker's clinic at the University of Innsbruck in 1897 and 1898. The patients anesthetized by Ludwig varied in age from two to sixty-four years. This authority believes that muscular resolution is never complete when this agent is used, but, on the other hand, he never had any accident. The pulse and respiration were increased in the beginning on account of a psychological action and then their frequency returned to the normal standard.

Wiesner, a surgeon in the Austrian army, has come to the same results in four hundred cases. Muscular resolution is, according to him, never complete, but he found it quiet sufficient for the reduction of old dislocations and to bring a fractured patella into apposition. Von Hacker has employed this drug without any bad result in patients afflicted with fatty degeneration of the heart, various respiratory affections, and in those weakened by abundant hemorrhages. The operations lasted from four to fifty minutes, and in the twenty-two cases the patients varied in age from seventeen to seventy-six years. Koenig of Berne, to whose experiments published in 1900 I have already referred, also records forty general narcoses, thirty-one of which were continued by ether. Among other surgeons who have resorted to the use of this excellent anesthetic may be mentioned Ware, Hoelsted, Stockun, Tchernig, Hafner, Severeano, Verneuil, Casdie, Seitz, Speier and Jacobs. Pollosson of Lyons has employed this drug as a general anesthetic in adult patients, and has lauded its advantages, and Nové-Jossierand has employed it currently in children either alone or as a mixed anesthesia, continuing the narcosis with ether. It has been largely used by Rolland and Cleré of Bordeaux, by Deroque of Rouen, and, in Chaput's opinion, chloride of ethyl will take the place of chloroform or ether in all minor operative work.

Malherbe has published the results of one hundred and seventy narcoses with chloride of ethyl. There were one hundred and forty anesthetics with this drug alone for various minor operations on the upper respiratory tract, such as the removal of adenoids and tonsils, the removal of cysts, antrotomy, etc. Nearly all these anesthetics were accomplished in Rose's position, the ages of the patients varying from two months to forty years. There were thirty mixed anesthetics, that is to say, chloride of ethyl followed by chloroform, both in children and adults, for various operations, such as abdominal operations, resections of bones, etc.

In giving chloride of ethyl Malherbe employed a compress, and the conclusions that he arrives at are as follows:

- (1) Small quantities of chloride of ethyl, from two to four grams, are sufficient for producing a narcosis lasting four minutes, and can be renewed indefinitely.
- (2) Rapidity of the anesthesia (from twenty-five to forty seconds).
- (3) Practically no congestion of the face or conjunctiva; never any cyanosis.
- (4) The period of excitement is reduced to a few

defensive movements, and these only in neurotic or alcoholic patients.

(5) Contraction in the beginning rarely exists and immediately disappears; no trismus, no salivation. Occasionally emission of urine.

(6) The age of the patient is indifferent, and no disturbing symptom occurs.

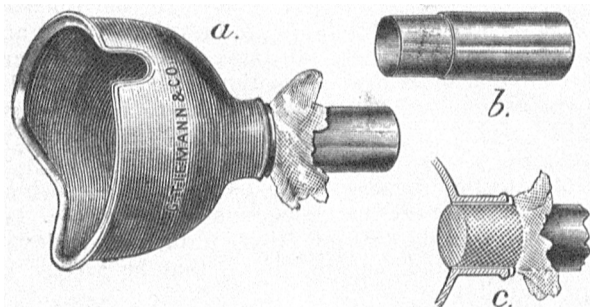
(7) Vomiting after administration of chloride of ethyl alone does not occur; vomiting occurring after a mixed anesthesia is not frequent, and if present rapidly subsides.

(8) Rapid return to consciousness.

Malherbe insists on the simplicity of the method he employs, and on the absolute safety and rapidity of the narcosis. From personal experience with this agent I can agree with the above conclusions in most respects. Reboul is very enthusiastic over anesthesia by chloride of ethyl, which he has employed in nearly two hundred cases, and Guinard uses it currently preparatory to the administration of chloroform, and this mixed anesthesia is also employed by quite a number of other Parisian surgeons.

The advantages of narcosis with this product in obstetrics have been placed in evidence by Lepage and Le Lourier. Ten cubic centimeters of the product are poured upon a compress folded in the form of a cone and covered with oiled silk, and this produces a narcosis of from three to four minutes, which is quite sufficient for the application of the forceps in the pelvic excavation, perineal sutures, or for an examination of narrow pelvis. If during the operation a longer anesthesia is desired, chloroform may be substituted for the chloride of ethyl.

There are two methods of giving chloride of ethyl, one by means of a compress saturated with the product, and the other with a mask manufactured expressly for this purpose. The French manufacturers of the chloride of ethyl, or as it is known in the market, "Kelene," have introduced an appliance which, although useful, is very expensive. The face piece can be blown up to any desired dimensions, and so fit any sized person. On top the cone is furnished with two valves, one through which air saturated with the anesthetic arrives during inspiration, the other giving exit to expired air. At each expiration the latter valve rises up, and is an excellent index as to the regularity of breathing.



We have used, however, a cone devised by Dr. M. W. Ware and manufactured by Tiemann & Co. of New York, which is very low in price and has given us in every instance most satisfactory results. It is an oval rubber cone, on the top of which is a hole about the diameter of a twenty-five-cent piece. Into this hole fits a metallic tube about two inches in length, through which the chloride of ethyl is

sprayed directly into the cone, three layers of gauze having been placed over the end of the tube which is inserted into the mask to prevent the anesthetic from coming into direct contact with the patient's skin. The cut here given shows the simplicity of the instrument better than words can express it.

There is one recommendation that we would make, namely, that it is not an indifferent matter to employ for general anesthesia any kind of product found on the market intended for local anesthesia. The products known under the name of "Kelene" and "Antidolorin" are very pure, and the manufacturers now put them up in graduated tubes, especially for general anesthetic purposes. The first named is a French make, while the second is an American product which is quite equal to the other. A third make, known by the name of "Anodynone," I have recently tried and find most satisfactory.

The mask is first placed on the patient's face and examined to see if it hermetically closes in around the nose, mouth and chin of the patient. The patient is then allowed to breathe naturally for an instant, and when the respiration has become regular and quiet the chloride of ethyl is sprayed down the tube of the apparatus. The patient is then asked to take a few long, deep inspirations, and in about thirty to forty seconds complete insensibility is obtained.

If, on the other hand, a compress is preferred, it is better to make it in the following way on account of the extreme volatility of the drug. Two thicknesses of gauze are folded over a thin layer of absorbent cotton, and over this on one side a piece of oiled silk is stitched on. Then the form of a cone is given to it and the chloride of ethyl is poured on to it in sufficient quantity. The cone is then hermetically applied over the nose and chin, while the hands are placed on the sides in order to prevent the entrance of air from underneath. The patient is then requested to breathe deeply, and in about fifteen inspirations anesthesia is obtained. It would seem from personal experience that the administration with the compress would be longer and much more difficult than with a rubber mask, and that more time would be consumed in getting the patient under the influence of the drug.

The doses of chloride of ethyl which have been employed to obtain general anesthesia vary from two to five cubic centimeters. These small doses we have not employed, and from the records of the cases given at the end of this paper, it will be found that ten cubic centimeters is the usual amount required. This, as is seen, is a much larger dose than that usually given by other surgeons, but if we give enough chloride of ethyl the narcosis is very much more rapidly obtained and its duration will be considerably longer. In one case, that of a young lady of twenty-five, 38 cc. were given before narcosis could be obtained, but the patient did not struggle and finally became unconscious. It will also be noted that the larger number of our cases has been major operations, and that consequently the anesthesia has been continued with ether. It is evident that chloride of ethyl can never completely replace either ether or chloroform, but nevertheless its advantages in the beginning of

the narcosis are so great that its use will without doubt become general when it is better known.

Although our personal experience with this anesthetic is as yet comparatively small, I think that it may be said, without concluding in a definite manner, that chloride of ethyl may be given to subjects of any age, principally at the two extremes of life, at a time when the organism does not as yet present, or, on the other hand, has lost that vitality which is requisite to support the shock of an anesthetic, be it either chloroform or ether. In examinations requiring a general anesthetic, there is nothing that can compare with it, and for short operations, such as arthrotomy, the opening of an abscess, deep cauterizations, curettement of the uterus, the reduction of certain dislocations and fractures, etc., it is ideal. General surgery is not alone to profit by the innocuity of chloride of ethyl, and throat specialists will find it of great value.

On account of the facility with which it is given, and its harmlessness, an experienced anesthetist is not required, and it may be given by any careful physician. These are the principal advantages which this anesthetic presents for operations of short duration, not lasting over four or five minutes. When used as a preliminary to the administration of ether, it avoids the period of excitement which is so disagreeable, and on account of its pleasant odor and non-stifling effect the most nervous patient will take it with ease. Besides this, the amount of ether used afterwards may be safely put at one-third or one-half less than would have been required had the anesthesia been entirely with ether. The transition from one anesthetic to the other is quite insensible. There is no doubt in my mind but that operative shock has been greatly diminished in the major operations I have done when chloride ethyl has been used as a preliminary anesthetic, and that nausea has been absent in almost all of them when consciousness has returned.

Such are the principal indications for the use of chloride of ethyl, and as to the contraindications, it may be said that up to the time of writing none have been given. The method is as yet too young for us to affirm that such will always be the case, and for the time we must wait for a greater experience to give sanction to the statements that we advance at this time. We have never seen any cyanosis, and the return to consciousness takes place with regularity and quiet.

The following list gives the nature of the operation, the age and the condition of some of the patients to whom this anesthetic has been given from July 10 to Oct. 10, 1902. My thanks are particularly due to Dr. Eugene E. Everett, who has administered the anesthetic in the greater number of the cases reported below.

CASE I. Male, thirty-two years old. Suppurating gonorrheal arthritis of the left knee. Arthrotomy. Dose employed, 17 cc. Complete narcosis in 35 seconds, lasting seven minutes. Return to consciousness quiet and rapid.

CASE II. Female, thirty-seven years old. Anal fistula. Incision and cauterization. Dose employed, 14 cc. Narcosis complete in 30 seconds, lasting six minutes. Rapid return to consciousness. No nausea.

CASE III. Female, twenty-five years old. Metritis *post abortum*. Curettement. Dose employed, 15 cc. Complete narcosis in 45 seconds. Duration of narcosis

seven minutes. Return to consciousness rapid. No nausea.

CASE IV. Male, fifty years of age. Dislocation of the shoulder. Reduction. Mitral insufficiency. Dose employed, 15 cc. Duration of narcosis five minutes. Consciousness rapidly regained. No nausea.

CASE V. Female, thirty-seven years old. Bilateral sclero-cystic ovaries, endometritis. Curettement, posterior colpotomy, and resection of ovaries. Dose employed 8 cc., anesthesia continued with ether. Duration of operation 35 minutes. Amount of ether given, 45 cc. No nausea following return of consciousness.

CASE VI. Female, thirteen years old. Removal of both tonsils and adenoids. Dose employed, 6 cc. Anesthesia obtained in 75 seconds. Struggling of short duration. Narcosis continued with ether, the total amount being 25 cc. Return to consciousness immediate. No nausea.

In this case the amount of chloride of ethyl given was not quite sufficient to obtain perfect unconsciousness.

CASE VII. Female, twenty-six years old. Double suppurating salpingitis. Very septic. Abdominal extirpation. Amount of ethyl chloride used, 12 cc. Narcosis continued with ether. Duration of operation, one hour. No nausea.

CASE VIII. Male, thirty-two years old. Gangrene of testicle, due to torsion of spermatic cord. Orchidec-tomy. Amount of ethyl chloride used, 10 cc. Narcosis continued with ether. No nausea.

CASE IX. Female, thirty years old. Movable kidney. Nephropexy. Amount of ethyl chloride, 12 cc. Narcosis continued with ether. No nausea.

CASE X. Female, twenty-eight years old. Exophthalmic goitre. Strumectomy of right lobe. Chloride of ethyl, 13 cc. Narcosis continued with ether. No nausea.

CASE XI. Female, forty-eight years of age. Carcinoma of the breast. Amputation. Although the patient was very fat, weighing about 275 pounds, 15 cc. of ethyl chloride were sufficient to produce complete narcosis in 45 seconds. Narcosis continued with ether.

CASE XII. Female, twenty-eight years old. Tuberculosis of the bladder. Suprapubic cystotomy. Amount of ethyl chloride employed, 15 cc. Narcosis continued with ether. No nausea.

CASE XIII. Male, twenty-seven years old. Varicocele. Resection of the veins and scrotum. Amount of ethyl chloride, 10 cc. Complete narcosis in 40 seconds. Continued with ether. No nausea.

CASE XIV. Male, thirty-two years old. Stricture of the urethra. Internal urethrotomy. About 10 cc. of ethyl chloride produced complete relaxation in one minute. Ether. No nausea.

CASE XV. Male, thirty-five years old. Stricture of the urethra. Internal urethrotomy. Ethyl chloride, 10 cc. Relaxation complete in 65 seconds. No resistance. Ether. No nausea.

CASE XVI. Female, twenty-seven years old. Ovarian cyst and pyosalpinx. Laparotomy. Ethyl chloride, 12 cc. Incomplete relaxation in 65 seconds. No resistance. Ether. No nausea.

CASE XVII. Male, fifty-five years old. Epispadias. Plastic operation. Ethyl chloride 10 cc. Complete relaxation in 58 seconds. No resistance. Ether. No nausea.

CASE XVIII. Female, twenty-one years old. Appendectomy. Ethyl chloride, 11 cc. Complete relaxation in 62 seconds. No resistance. Ether. Very little nausea.

CASE XIX. Female, fifty years old. Malignant tumor of the ovary. Laparotomy. Ethyl chloride, 10 cc. Complete relaxation in 62 seconds. No resistance. Ether. Very little nausea.

CASE XX. Male, sixty years old. Carcinoma ventriculi. Exploratory incision. Ethyl chloride, 13 cc. Complete relaxation in 64 seconds. No resistance. Ether. No nausea.

CASE XXI. Female, forty years old. Hemorrhagic metritis. Vaginal hysterectomy. Ethyl chloride, 15 cc. Complete relaxation in 68 seconds. No resistance. Ether. No nausea.

CASE XXII. Male, twenty-one years old. Appendicular abscess. Laparotomy. Ethyl chloride, 12 cc.

Complete relaxation in 50 seconds. No resistance. Ether. No nausea.

CASE XXIII. Female, thirty-two years old. Bilateral laceration of the cervix, retroverted uterus, sclerocystic ovary, prolapsed. Laparotomy. Ethyl chloride, 12 cc. Incomplete relaxation in 75 seconds. No resistance. Ether. No nausea.

CASE XXIV. Female, seven years old. Tonsils and adenoids. Ethyl chloride, 5 cc. Complete narcosis in 15 seconds. Ether. No nausea.

CASE XXV. Female, thirty-five years old. Curettage. Ethyl chloride, 8 cc. Incomplete relaxation in 58 seconds. No resistance. Ether. No nausea.

CASE XXVI. Female, thirty-five years old. Pregnancy, complicated by fibroid tumors. Conservative Cesarean section and myomectomy. Ethyl chloride, 10 cc. Complete relaxation in 65 seconds. No resistance. Ether. No nausea.

CASE XXVII. Female, fifty-four years old. Excision of axillary glands. Ethyl chloride, 10 cc. Complete relaxation in 65 seconds without resistance. Ether. No nausea.

CASE XXVIII. Female, thirty-five years old. Suppurating mastitis. Excision of abscess. Ethyl chloride, 12 cc. Complete relaxation accompanied by some resistance in 75 seconds. Ether. No nausea.

CASE XXIX. Female, forty-five years old. Adenoma of thyroid gland. Strumectomy of right lobe. Ethyl chloride, 10 cc. Complete relaxation without resistance in 75 seconds. Ether. Slight nausea.

CASE XXX. Female, forty-three years old. Floating body in knee joint. Arthrotomy. Ethyl chloride, 15 cc. Complete relaxation without resistance in 70 seconds. Ether. Very little nausea.

CASE XXXI. Male, five years old. Unconsolidated fracture of the humerus. Bone suture. Ethyl chloride, 8 cc. Narcosis complete in 55 seconds, without resistance. Ether. No nausea.

CASE XXXII. Male, two years old. Phymosis. Circumcision. Ethyl chloride, 6 cc. Complete relaxation without resistance in 60 seconds. Ether. Immediate return to consciousness without nausea.

CASE XXXIII. Female, thirty-two years old. Appendectomy. Ethyl chloride, 12 cc. Complete relaxation without resistance in 70 seconds. Ether. Very little nausea.

CASE XXXIV. Female, twenty-eight years old. Septic miscarriage. Curettage. Ethyl chloride, 9 cc. Complete relaxation without resistance in 65 seconds. Ether. No nausea.

CASE XXXV. Female, twenty-six years old. Double pus tubes and vulvo-vaginal abscess. Excision of vulvo-vaginal glands, and laparotomy. Chloride of ethyl, 15 cc. Complete relaxation without resistance in 70 seconds. Ether. Slight nausea.

CASE XXXVI. Female, twenty-four years old. Curettage. Ethyl chloride, 20 cc. Incomplete relaxation with slight resistance in 90 seconds. Ether. No nausea.

CASE XXXVII. Female, forty years old. Laparotomy. Ethyl chloride, 20 cc. Incomplete relaxation with considerable resistance in 90 seconds. Ether. No nausea.

CASE XXXVIII. Male, thirty years old. Appendectomy. Ethyl chloride, 15 cc. Complete relaxation without resistance in two minutes. Ether. No nausea.

CASE XXXIX. Female, thirty-three years old. Cystoscopy. Ethyl chloride, 20 cc. Complete relaxation with slight resistance in two minutes. Ether. No nausea.

CASE XL. Female, thirty-five years old. Laparotomy. Ethyl chloride, 15 cc. Complete relaxation without resistance in 90 seconds. Ether. No nausea.

CASE XLI. Female, fifty years old. Excision of carcinomatous lymphatics. Ethyl chloride, 12 cc. Nervous crying without resistance, narcosis in 70 seconds. Ether. Very little nausea.

CASE XLII. Female, twenty-eight years old. Double ingrowing toe nail. Ethyl chloride, 20 cc. Complete relaxation without resistance in two minutes. Ether. No nausea. This patient had been operated on twice before, ether having been used at each operation, which was followed by nausea, lasting twenty-four hours each time.

CASE XLIII. Male, two years old. Phymosis. Circumcision. Ethyl chloride, 9 cc. Complete relaxation with crying and resistance in 90 seconds. Ether. No nausea.

CASE XLIV. Female, thirty years old. Laparotomy. Ethyl chloride, 13 cc. Complete relaxation without resistance in 70 seconds. Ether. No nausea.

Up to Dec. 30, 1902, I have had ethyl chloride administered preliminary to ether in 153 cases without the slightest accident, and in each case with much comfort for both patient and operator.

## Medical Progress.

### RECENT PROGRESS IN GENITO-URINARY SURGERY.

BY F. S. WATSON, M.D., AND PAUL THORNDIKE, M.D.

#### SURGICAL INTERVENTION IN CASES OF MEDICAL NEPHRITIS. (A. POUSSON.)

Pousson<sup>1</sup> reviews the above subject exhaustively and adds certain personal experiences of his own to the cases already published in the literature.

Surgical intervention in cases of nephritis is considered with reference to two distinct classes of disease, — first, acute toxic infections, and, second, the subacute or chronic form of nephritis or true Bright's disease. Of the former, Pousson has had four cases. In two of them nephrotomy, and in two nephrectomy was performed; three of the patients recovered and one died. In one case the infection appeared in the course of an attack of grip. Two cases were colon bacillus infections, and one was a fresh infection of an old pyelo-nephritis.

Nephrotomy is given preference as the operation to be performed in the cases of acute infection, such as those just referred to.

Pousson's experience of surgical intervention in cases of Bright's disease is limited to six cases, in which eight operations were performed. Two of these patients died, nephrotomy was performed in all the cases, in one it was repeated on one side after having been at first done on the other. Nephrectomy was performed subsequent to nephrotomy in one case. The cases are exhaustively detailed and careful examinations of the urines are included in the articles. In four of the cases of diffuse chronic nephritis, there was marked amelioration of the symptoms, in one of them to all appearance a cure. The writer summarizes the results hitherto published, and discusses the subject from various points of view. Pousson reviews the cases hitherto published, beginning with those of the pioneer of the treatment, Edebohls of New York, who reported in the New York Medical Record, Dec. 21, 1901, eighteen cases in which surgical operation upon the kidneys, which were the seat of chronic interstitial nephritis, resulted favorably upon that condition. In all but the last two of these nephropexy was performed on one or both kidneys. In these the capsule of the kidney was excised.

Edebohls calls attention to the fact that Bright's disease may be unilateral. He gives the technique of decapsulation, and the results of the operations performed by him. In all the nephropexies

<sup>1</sup> *Annales des Maladies des Organes Genito-Urinaires*. Nos. 5, 6 and 7. May, June and July, 1902.