

GUY'S HOSPITAL, LONDON.

42. R. Alcoholis, f. ℥j.
 Chloroformi, f. ℥ij.
 Ætheris sulphurici, f. ℥ij. M.

This is preferred where chloroform is badly taken; and the safest administration is said to be to put the patient under the influence of chloroform, and then to keep him anæsthetized by the use of this mixture. It should be well shaken. In this country it has been extensively tried, with satisfaction. (See *Medical and Surgical Reporter*, Oct., 1872.)

DR. W. L. ATLEE, OF PHILADELPHIA.

43. R. Chloroformi, f. ℥j.
 Ætheris sulphurici, f. ℥ij. M.

The objection to the immediate mixture of the two anæsthetics, such as this, is that they do not mingle, and the patient is apt to take the ether first and then be overcome by the heavier chloroform. It is important, therefore, that the bottle be well shaken each time before the contents are thrown upon the inhaler.

Dr. E. SANSOM prefers a mixture of one part of chloroform to either one or two of absolute alcohol. Dr. BENJAMIN W. RICHARDSON combines ether with bichloride of methylene.

Of these various combinations, that used at Guy's Hospital (F. 42) has obtained the widest popularity, and should be employed in preference to either drug alone, when it is believed the patient is dangerously susceptible to anæsthetics.

For *chloramyl*, see page 49.

DR. WACHSMUTH, OF BERLIN.

This writer (*Allg. Wiener Med. Zeitung*, Nov. 15th, 1878,) recommends:

44. R. Chloroformi, 5 parts.
 Olei terebinthinae, 1 part. M.

He claims that the chloroform is more rapidly absorbed, and its danger much lessened.

LOCAL ANÆSTHETICS.

ACETIC ACID.

The following, mixed in a thin flask, will produce vapor which induces local anæsthesia in five minutes:

45. R. Glacial acetic acid, āā
 Chloroform, partes equales.

ALCOHOL.

Dr. HORVATH, of Kieff, has proposed a method of employing alcohol for producing local anæsthesia. It is well known that if the hand be immersed for a short time in ice-water, severe pain is caused. Dr. HORVATH found that no such pain was produced when the hand was immersed in cold alcohol, not even when the temperature of the alcohol was as low as 5° C. Glycerine was found to possess a similar property. Ether caused pain, and quicksilver more acute pain still, causing the speedy withdrawal of the finger when plunged into this liquid at a temperature of 3° C. It was next ascertained that when the finger was held for quite a long time in alcohol having a temperature of 5° C., no pain was experienced. Moreover, although the faintest touch was distinctly perceived in his finger, no pain was experienced from sharp pricks. The application of cold alcohol has the effect of depriving the part of the special sensibility to pain, without, however, impairing the delicacy of the general tactile sensation, which, as is well known, resides in the superficial integument.

CARBOLIC ACID.

In the application of the actual cautery, and such procedures, the pain may be avoided by the application of carbolic acid. This local anæsthetic is not used with near the frequency which its efficacy deserves.

Pure carbolic acid should be applied to the parts to be cauterized, which are then covered with a light compress; after a short time, before the anæsthetic effect has passed off, apply the cautery. There will be a complete absence of pain. It is immaterial whether the acid be liquid or crystallized; in the former case it is to be applied with a brush, in the latter it extends over the parts as it liquefies.

Dr. J. H. BELL prefers to soak the part, when practicable, in a three per cent. solution of the acid for fifteen minutes, and then to draw a brush dipped in the pure acid along the line of the incision. (*American Journal of the Medical Sciences*, Oct., 1870.)

Dr. ANDREW H. SMITH, of New York, in illustration of this anæsthetic property, relates that he painted on his forehead a spot an inch in diameter with an eighty-five per cent. solution of the acid. For a minute it caused a slight burning, then the skin became quite numb, whitened and shriveled; at this point he made an incision half an inch long without even feeling the knife, the wound from which afterwards healed as usual. Three hours afterwards he thrust, without pain, a needle into the skin; and next he applied a blister to the carbolized skin, without causing pain or vesication. He had used this application in opening whitlows, and found the pain of the operation greatly less than ordinary.

Dr. L. H. A. NICKERSON, of Quincy, Ill., has presented strong evidence that it is the *crezol* and not the *phenol* in carbolic acid which possesses the anæsthetic power. (*American Medical Bi-weekly*, March 16th, 1878.) He has found the following an admirable mixture to allay the acute pain after the application of caustics, in burns and scalds, active gonorrhœa, etc.:

46. R. Acidi carbolicæ (Calvert's No. 4), gtt. ij.
 Aquæ calcis, f. ℥j. M.
 For local use.

The acid must be the impure form, containing *crezol*, as the preparation known as No. 4 of Calvert's. The crystallized acid or *phenol* does not produce the same results.

CARBON BISULPHIDE.

This substance has been employed by Dr. S. R. NISSLEY, of Ohio. His mode of application is this: Place a pledget of cotton in a wide-mouthed vial, saturate it well with the bisulphide, and apply it to the painful part, and as soon as the patient complains of a smarting sensation, change the position of the bottle, carefully following the course of the principal nerve that seems to be distributed on the part.

In the *Gaz. Med. de l'Algerie*, Dr. CHARLES BERNARD relates several cases in which sulphide of carbon was employed to produce

local anæsthesia. In one case six grammes, poured drop by drop on the part, and made to evaporate quickly, acted efficiently; and in another case, ten grammes applied by a spray apparatus enabled the operator to make six deep incisions into a large carbuncle without inflicting pain.

CARBONIC ACID GAS.

As early as 1835, Dr. DEWEES, of Philadelphia, reported the employment of carbonic acid gas as a local anæsthetic in carcinoma uteri.

Dr. THEODORE A. DEMMÉ, of Philadelphia, has reported a number of cases in the *Medical and Surgical Reporter*, Feb. 18th, 1871, in which the "gas had proven to be of inestimable value, not only in relieving agony and suffering, but even in saving life, when all other means would probably have failed." These cases were of painful labor with threatening exhaustions, and rigid, unyielding and irritable uteri.

The materials used for generating the gas are the bicarbonate of soda and tartaric acid.

A common pint bottle, having attached an elastic tube about three feet in length, passing through the cork, should be provided. Into this pour three or four ounces of water, then introduce half an ounce of bicarbonate of soda, and lastly the same quantity of tartaric acid in a granular or crystalline form. The free extremity of the tube may be then applied to the sensitive part, so that the gas is thrown upon it in a stream. Some precautions are required. The patient's head should be elevated, and abundance of fresh air furnished. In obstetric cases the child, as soon as born, should be removed from the bed.

CHLORAL HYDRATE.

This drug is an efficient paralyzant of the sensory nerves. In cases of extensive burns of the first and second degrees, Dr. S. S. RIDDELL, of Wisconsin, reports almost immediate relief from

47. R. Chloral hydrate, ℥ iij.
 Carron oil, f. ℥vj. M.
 Use locally.

The first application causes a stinging sensation, rapidly followed

by entire relief. (*Medical and Surgical Reporter*, January, 1877.)
Another form in which to use it is :

48. R. Chloral hydratis,
Pulveris camphoræ, āā q. s. M.

The two solids unite to form a viscous liquid of considerable power to reduce pain.

Dr. W. B. KESTEVEN, of London, (*Lancet*, Feb., 1877,) has used the following with gratifying success in neuralgic pains, cancer of the breast, etc. :

49. R. Chloral hydratis, ℥ ss.
Glycerinæ, f. ℥ ss.
Aquæ, Oj. M.

Saturate lint, apply to the part, and cover with lint or spongio-piline, wrung out of warm water.

ETHER.

The local application of ether spray was proposed by Dr. BENJ. W. RICHARDSON, and has at times been popular. The fluid should be rectified, perfectly neutral, sulphuric ether, and held at a distance of two inches from the part to be affected. Dr. LETAMENDI, in the *Archives de Physiologie*, Nov., 1875, adds the following directions :

After about two minutes the part of the skin on which the spray has fallen becomes red, and is the seat of a disagreeable sensation of cold; there is no sensation of burning in the part.

If, at this moment, an incision, eight or ten millimetres long, is made with a convex bistoury in the centre of the reddened part, not being carried deeper than the papillary layer of the cutis, immediately the incision is made, there is suddenly produced an anæmic zone, which enlarges outward from the point incised, as a circle goes on enlarging on the surface of water into which a pebble has been dropped.

If the spray is again directed for a few seconds on the part which has thus become anæmic, the region becomes perfectly bloodless and completely anæsthetic. The tissues when cut are like frozen fat, and have lost their elasticity. Around the white circle there is a zone in which the anæmia is not absolute. The spray directed on this zone speedily makes the anæmia and consequent anæsthesia complete. The anæsthesia can thus be carried around or along a limb.

Another plan of using ether is the following :

50. R. Pulveris camphoræ, ℥ iv.
Etheris sulphurici, ℥ j. Dissolve.

By rubbing this mixture on the skin for about a minute, a transient, superficial loss of sensibility is obtained, which renders slight operations almost painless.

Dr. LANENSTEIN, of Hamburg, writes (*Centralblat für Chirurgie*, July, 1880,) that local etherization is now unduly neglected. At the Hamburg Hospital it is regularly employed in opening abscesses, making incisions in phlegmon, &c., counter-openings, tenotomy, operations on the bursæ, the removal of small foreign bodies, and the extirpation of small cutaneous and subcutaneous tumors. It is also employed in phimosis, but as a general rule it should be avoided in operations about the genitals, as the ether causes so much pain, and the intervention of a thick layer of moistened wadding is required. The spray is much to be recommended in the removal of ingrowing toenail, and patches of lupus may be scooped out under its action. Affections of the nose or lips should be exempted, as the inspiration of the concentrated ether may prove dangerous, as it may also in operations on the gums, which are excessively sensitive to its action. The cheeks, forehead, and aural region may be acted on, protecting the eyes with moistened wadding. The great reduction of temperature which is produced does not interfere with the healing of the wounds. Great care is required not to bring the ether near light of any kind, for fear of explosion; but this inflammability does not contra-indicate its employment with the actual or galvanic cautery—the parts being first dried with wadding. The spray is very useful during transplantation, especially in private practice, when the patient has himself to supply the grafts. Under the spray they can be removed without any pain, and owing to the hardness of the skin produced, this can be more easily effected. "To sum up my experience with ether spray, it is well suited for short and superficial operations, of small applicability to extensive operations, and is unsuited for those on the nose, lips, serotum and mucous membranes."

THE ESMARCH BANDAGE.

The use of the *Esmarch Bandage* has been found by M. CHAUVEL, surgeon, to bring about a numbing of sensation, and has been applied by him as a local anæsthetic. Diminution of sensibility was observed

in each individual, not appearing immediately, but in five to twenty minutes. Insensibility appeared more quickly in the upper than in the lower extremities, its intensity depending on the tightness of the application; it first appeared in the peripheral portion of the trunk, and gradually spread to the upper regions. Insensibility to painful impression was first noticed, but whether this extended beneath the surface was not ascertained.

In two operations for ingrowing toe-nail with the use of elastic compression, very little complaint was made by the patient. In a case of ischiatic trouble the actual cautery was used after compression; anæsthesia, however, was incomplete. It is evident that elastic compression would fail in bringing about complete anæsthesia unless the ligature was placed so near the central portion of the limb as to cause other and inconvenient results. The conclusion is that, as an anæsthetic, compression cannot exclude chloroform or ether.

ICE.

The application of ice to a part lessens its sensibility. A still greater degree of cold is obtained by *Arnott's freezing mixture*.

51. R. Pulverized ice, 4 oz.
Pulverized common salt, 2 oz.
Mix quickly and thoroughly with a knife.

This mixture is placed in a thin gauze netting, and laid upon the part to be benumbed. The netting should occasionally be raised to watch and equalize the remedy. Ordinarily from fifteen minutes to half an hour will be required to produce the desired anæsthetic effect. The application is not without risk, as the part, if not carefully watched, may be frost-bitten.

IODOFORM.

This has been used with success as a local anæsthetic, and obtunds the sense of pain. It has, however, such a penetrating, disagreeable odor that it has not become popular.

MENTHOL.

This crystalline product of the Japanese oil of peppermint is an

efficient local anæsthetic, both for the relief of acute pain and also for producing temporary loss of sensibility in a part about to undergo a slight operation.

MORPHIA.

The sulphate of morphia has been used hypodermically before surgical operations to bring about local anæsthesia. Dr. SPESSE recommends the following:

52. R. Morphiæ sulphatis, gr. j.
Aquæ destillatæ, f. ʒj. M.
For hypodermic use.

POTASSIUM BROMIDE.

It is stated by Dr. MARTIN F. COOMES, in the *Louisville Medical News*, 1876, that a saturated solution of bromide of potassium applied to a muscle, or injected into its vessels, will cause paralysis. When first applied to a mucous membrane it is irritant, and then anæsthetic. A wash or gargle of grs. xv-xx to aquæ f. ʒj, will often be found very serviceable to produce temporary local anæsthesia of the mouth, fauces, urethra or pharynx.

RHIGOLENE.

This substance, a product of the distillation of petroleum, and the lightest liquid known, was suggested by Dr. HENRY J. BIGELOW, of Boston, for freezing the skin by use in a spray-producer. This it will do in from five to ten seconds. It is serviceable in opening abscesses and felons, in removing small tumors, in amputations of the fingers and toes, and similar minor operations. It is very inflammable, however, and if the application is at all protracted, discoloration of the surface and desquamation of the cuticle are liable to follow.

SAPONIN.

This is an amorphous, white powder, soluble in water, obtained from the *saponaria officinalis* and other plants. It is stated by Dr. KOHLER (*London Medical Record*, February, 1874,) to bring about, applied in a concentrated solution, paralysis of both motor and sensory nerve filaments. Later experiments have shown it to be unmanageable and dangerous.

FARADIC ANÆSTHESIA.

The benumbing effects of the faradic current on the nerves has been utilized for the production of local anæsthesia. For opening abscesses a strong faradic current should be directed through the parts as the incision is made. The relief thus afforded is slight, but is positive. (BEARD.)

Faradic anæsthesia has been chiefly used in the extraction of teeth, where it is certainly of some service; but on account of the popularization of nitrous oxide it has fallen into disuse. It may still be occasionally applied with advantage for the relief of the irritation caused by the application of caustics to the larynx, eye or uterus. In the extraction of foreign bodies under the skin or nails, it has also applications which should not be neglected. Of course, its employment is confined to short and slight operations.

ANÆSTHESIA OF THE LARYNX.

Of the various methods of applying anæsthetics locally to the larynx, Professor SCHRÖTTER'S is most popular in Germany. His method is as follows: The evening before the operation, the glottis is painted with pure chloroform about a dozen times, and an hour afterwards with this solution of morphia:

53. R. Morph. hydrochloratis, grs. xij.
 Aquæ destillatæ, f. ʒ ij. M.

During the use of the morphia the patient must not swallow his saliva; indeed, after each use of the brush it is prudent to let him gargle his throat with a solution of tannic acid. Early the next morning the operation can be undertaken. If the patient be still sensitive, the whole proceeding must be repeated.

Prof. GERHARDT recommends as an anæsthetic, painting the laryngeal mucous membrane with a solution of *colchicum*.

Dr. FAUVEL, of Paris, objects to the German practice, though without apparent good grounds. He says the sucking of ice during the hour which precedes the operation, and the use of strongly astringent gargles, or of a gargle composed of a concentrated solution of *bromide of potassium*, are the best means of producing local anæsthesia. (*Dobell's Reports*, 1876.)

Dr. GLASGOW (*St. Louis Med. and Surg. Journal*, Dec., 1879,) recommends *carbolic acid* or *chloral*. He has found, 1st. Carbolic acid, in strong solutions, produces anæsthesia of the larynx and relieves pain. The application causes an intense burning, which lasts about twenty seconds; the anæsthetic condition continues about two hours. 2d. The hydrate of chloral, in strong solution, applied to the mucous membrane, produces anæsthesia. The application causes a severe burning pain, lasting over a minute; the anæsthesia does not continue longer than one-half hour. 3d. The strength of the solution necessary to produce anæsthesia varies somewhat in different persons. 4th. It is recommended that the weaker solution be applied first, and this can be followed by the stronger solution. The first application is the only one causing pain. 5th. No bad results, either constitutional or local, have followed the application of strong solutions of carbolic acid.

Other surgeons (ZAWERTHAL, 1880,) have stated that there is considerable danger of laryngitis or of poisoning in any of these methods of anæsthetizing the larynx.

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