

## METHYLENE CHLORIDE IN ANAESTHESIA

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DURING the last two years interest has been revived in the use of methylene chloride ( $\text{CH}_2\text{Cl}_2$ ) as an anaesthetic. For a time after its introduction into surgery in 1867 by Richardson, this substance enjoyed considerable favour in some quarters, but eventually it fell into disuse. Considerable confusion characterizes the early reports concerning methylene chloride because the material supplied in the trade evidently was not what it purported to be; one preparation at least was demonstrated to be nothing more than a mixture of chloroform and methyl alcohol. Consequently some of the statements concerning methylene chloride were in reality based upon the use of chloroform.

In 1884, Regnauld and Villejean<sup>1</sup> described experiments on dogs in which a pure preparation of methylene chloride compared with the action of chloroform. Their description of the action of the former is worth quoting:

*“After one-half minute of inhalation—Commencing agitation; some barking; One and a half minutes—Dilation of pupil; beginning corneal insensibility, nystagmus; Two minutes—Abolition of corneal and palpebral reflexes; general insensibility; persistent nystagmus; Three minutes—Clonic movements; simulating running or better swimming; all four legs and tail participate; Four minutes—The same phenomena continue; inhalation discontinued. Animal loosed and left to itself. In spite of the insensibility the clonic movements in the muscles of legs, face, prepharyngeal region and diaphragm continue; Six minutes—Returning consciousness. Corneal reflex reappears. Contracture of the jaws persists; anaesthesia not over; Seven minutes—Epileptiform or choreiform attack; Nine minutes—Contracture of jaws and neck persists; Eleven minutes—Symptoms diminish. Animal tries to stand but its paws support it much as in the case of strychnine poisoning; Twenty minutes—Contracture of muscles of the neck; Twenty-two*

*minutes—Animal cannot open mouth; strabismus; Twenty-two to Thirty minutes—Return to normal state. However, the dog whose jaws can now be opened, keeps its head lowered, does not answer the call of its keeper and seems under the influence of a kind of hallucination.*

We have repeated this experiment with the exception that a cone was employed instead of a Junker inhaler, and can confirm the above statements in all essentials. The methylene chloride was administered for 20 minutes and at no time was there a degree of quietness or relaxation which would indicate its value as an anaesthetic.

In another experiment the animal was placed in a glass case into which air carrying methylene chloride vapour was blown (the apparatus was that usually employed in this laboratory for inducing ether anaesthesia in dogs). By employing a considerably higher concentration of methylene chloride than is necessary in the case of ether, a condition approaching ether anaesthesia was produced after about 15 minutes. The induction was marked by extremely violent muscular activity and the abundant secretion of saliva. The animal was then removed from the case and prepared for the measurement of blood pressure, the mixture of air and anaesthetic vapour being administered intrapharyngeally. For a short time the fairly complete anaesthesia continued, but thereafter restlessness and violent movements superseded to such an extent that the advisability of employing methylene chloride alone as a surgical anaesthetic was certainly not encouraged, though throughout the motor excitement obtaining the animal was insensible to pain. The blood pressure remained high for about twenty minutes, after which the concentration of the anaesthetic was increased to the limit and a typical chloroform death ensued.

Hellwig<sup>2</sup> has recently employed methylene chloride for narcosis in man. He found it “entirely unsuited for complete narcosis.”

Following the stage of analgesia in which there was loss of consciousness and susceptibility to pain, a period of excitement developed such as is rarely seen after either ether or chloroform, and conforming well with the condition in dogs described by Regnaud and Villejean. In the attempt to overcome the excitement stage, an alarming condition developed. To be sure, the muscle tone relaxed completely, but simultaneously breathing became laboured, deep and extraordinary salivation began. There was deep cyanosis, sweating, maximal pupillary dilatation, and a rapid weak pulse. To avoid a calamity the narcotic was discontinued; respiration was stimulated mechanically and oxygen was given. Recovery was complete and the operation continued under ether. Hellwig then employed the substance for the induction of narcosis and as a substitute for ethyl chloride in which cases it was satisfactory. Recovery is not so rapid as in the case of ethyl chloride which may be of advantage in switching over to ether or chloroform. Methylene chloride appeared to be of especial value in connection with operations performed under local anæsthesia to obviate the undesirable effects of the operative procedure on the mental anxiety of the patient. It was found possible to maintain a condition of analgesia for hours without any subsequent ill effects on heart, kidneys, liver or lungs.

The animal experiments recorded indicated decided limitations to the use of methylene chloride, but in view of Hellwig's observations it seemed desirable to employ it clinically. Ac-

cordingly it has been used on a number of occasions during the past three months at the Montreal Maternity Hospital, and at the Montreal Western Hospital. In human subjects a stage of anæsthesia not seen with other agents was observed, that is, between the so-called first and second stages a period ushered in by analgesia occurs, which is characterized by anæsthesia without loss of muscular power. This stage is followed by one of severe excitement if the administration is continued. The limits of clinical application are therefore restricted to those effects which occur prior to the violent muscular activity. The desired stage can be attained by administering methylene chloride to a point at which consciousness is lost. Administration of the drug is then discontinued, but on the first sign of return of consciousness is renewed, so that by a process of intermittent administrations the pain of many procedures may be alleviated. We can recommend its use for the relief of the pains of labour in which the contractions of the uterus do not seem to be impaired, for the induction of anæsthesia prior to the use of other less agreeable anæsthetic agents, in all outdoor minor surgical procedures, for painful dressings, and particularly in dentistry for the extraction of teeth and the preparation of painful cavities.

## REFERENCES

- (1). REGNAULD AND VILLEJEAN. *Comptes rendus de la Société de Biologie*, 1884, p. 159.
- (2). HELLWIG. *Klinische Wochenschrift*. 1922, p. 216.

**Sudden Death in Scarlet Fever.**—During a period of nine years (1913-1921), 2,322 patients with scarlet fever were treated at the Durand Hospital, with a total mortality of eighty-five, or 3.7 per cent. In two instances, death occurred suddenly and unexpectedly with only slight premonitory signs, and when each patient appeared to be on the road to convalescence. These two cases are reported in detail by T. F. Krauss, Chicago. The virus or toxins of scarlet fever seem to have an especially deleterious effect on the heart in some cases, as Welch and Shamberg point out. In those reported by Gouget and Deschaux, by Weil and Mouriquand, and also

in the author's, direct action on the myocardium is apparent. Broadbent is inclined to believe that it has its action on the heart ganglions. No evidence was found in the author's case to bear out this view. Since grave myocardial lesions may not be apparent clinically, and since in many of these cases death has followed some slight physical exertion, it would seem that absolute rest in bed is indicated in all cases of scarlet fever, especially during the acute stages, and more particularly in those in which one may suspect myocardial lesions.—*Jour. Am. Med. Assoc.* February 17th, 1923.