THE PRESENT POSITION OF AVERTIN ANÆSTHESIA

By KEMPSON MADDOX, M.D., M.R.C.P.

A VERTIN has now been administered to something over a million and a half of the world's population, to individuals ranging from a few months to 96 years of age, and for practically every reason for which a narcotic is required. After five years' use it is desirable to take stock of the situation, to ask whether its promise has been justified and whether it is destined for abandonment or continuance in a limited sphere.

In the first place it cannot be denied that it was through avertin that the humane concept of basal anaesthesia became introduced. Before 1928 premedication was known and practised extensively, but unfortunately did not always mean prenarcosis. Avertin, by guaranteeing sleep, great reduction in ether consumption and a retrograde amnesia in almost every case was welcomed as the fulfilment of a long-felt want. As the forerunner of a host of injectable or oral anaesthetic agents which are less recoverable than the inhalation anaesthetics, it had many prejudices to overcome and many doubts to subdue. Our present survey may best be furthered by the resurrection of some of these objections and the examination of them in the light of subsequent experience.

1. "Avertin is dangerous and increases surgical risk." Every general anaesthesia is dangerous to some degree, it will be generally admitted. There are only three methods of assessing the "danger" of any drug, these are (a) Experimental pharmacology, including the administration of the drug to the laboratory animal in increasing doses until death constantly ensues. The lethal dose is thus determined for each particular animal, and the margin of safety can be expressed as a quotient when compared with the average minimum narcotic dose, providing this is sufficient for sur-
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The words "for each particular animal" reveal the weakness in this method, by which only a very approximate guide can be obtained for the use of the drug in man. Lendle, however, was able to show that avertin was highly satisfactory in this respect.

(b) Experience of able senior anaesthetists who, in virtue of their long acquaintance with traditional anaesthesia and its hazards, are able to form a valuable opinion as to the toxicity of any new anaesthetic in regard to a particular class of patient. This estimate, in my opinion, is not given the weight it deserves. Statistics, laboratory tests, and other objective evidences are always being called for, but I would as well prefer the considered and dispassionate opinions of such anaesthetists as Shipway and Blomfield, who, after a thousand administrations of avertin, have no complaints to make whatever. It is indeed noteworthy that the highest praise of avertin anaesthesia always emanates from those who have had the most experience of the drug, and unfavourable criticism from those who had the least.

(c) Mortality statistics. In general statistics are universally admitted to be notoriously unreliable. In particular, one of the most uncertain classes of statistics to those who have had to examine them are those relating to death after operation.

Post-anaesthetic deaths are usually estimated at so many per 10,000 or 100,000 or recorded as a percentage. To carry this to two or more decimal points or to argue on slight differences is to display poor actuarial and professional insight, so many factors are there which have to be considered. Provided any anaesthetic has a mortality figure in the neighbourhood even of that accepted for ether given in the other method "open" it may be regarded as "safe." Avertin passes such a standard.

In 1931 Schüberth analysed 72 deaths which occurred during or after an operation in which avertin was one anaesthetic agent employed in a series of about 250,000 administrations. He could ultimately accept only 14 of these in which avertin was probably the cause, and in the majority of cases this was due to an over dosage or to combination with one or more other powerful narcotics. Professor Anschütz in his "Die
Darmnarkose mit Avertin" estimated that in 1930 one death occurred in 10,000 administrations, but that this figure should be now one in 25,000 owing to improved technique in administration.

This is mainly in a return to the standard doses of .1 gm. per Kg. with not more than 1/6 gr. morphia. I submit for your perusal a detailed list of mortality figures in Germany prepared by Anschütz. They show ten deaths in 81,510 administrations by 36 authors distributed as follows:—

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<td>Dose .06-.1</td>
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A current idea in Sydney about two years ago was that avertin was not only desirable but actually indicated for bad surgical risks, yet if the patient died the drug was invariably held responsible. It would be valuable to examine closely our local deaths, but I found on inquiry in two large hospitals that either the records of anaesthetic deaths were not isolated as such or that there was insufficient evidence in the notes or investigations to allow critical judgment. Certain it is, however, that in so far as it is allowed the amount of inhalational anaesthetic to be substantially reduced avertin has a definite sphere in the surgery of those affected with chronic lung disease. A combination of avertin, local and gas-oxygen anaesthesia has been claimed to be the safest yet conceived.

(2) "The rectal route has many disadvantages, including that of inability to recover the drug."

I would contend on the other hand that the rectal route has many advantages over inhalational or intravenous routes or even the oral. Absorption from the colon is rapid and constant. It is less active than the stomach, thereby giving more time, better facilities and less risk for washing out the drug should any alarming symptoms develop early. A drug injected intravenously is wholly irrecoverable and the elimination of a volatile anaesthetic depends largely on efficient artificial respiration. While avertin is absorbed very
quickly anaesthesia can be appreciably shortened by washing out after 20 to 25 minutes.

Rectal anaesthesia has a special field in restless or emetic states or for anaesthesia “by stealth” in goitre surgery. There are strikingly few instances of diarrhoea or colonic irritation following avertin. A recommendation this year by H. K. Ashworth that the Universal Indicator (B.D.H.) should replace 1 in 1,000 Congo Red as an indicator of free hydrobromic acid is consequently scarcely necessary apart from the fact that the indicator is really too sensitive for this purpose.

(3) "Avertin causes too much respiratory depression and fall of blood-pressure which predispose to post-operative, pulmonary sequelae."

These statements are partly true. Respiratory depression is an inseparable feature of avertin anaesthesia as it is of natural sleep. Cyanosis, however, cannot be regarded so lightly provided, of course, that the airway is perfectly clear. Mild cyanosis should not be regarded with alarm, but, personally, if I see the slightest evidence of cyanosis with a clear airway I now give "Coramine" and some CO₂. It is better to give these restoratives early than late, and more frequently than may actually be necessary. I have done this on three occasions only. "Coramine" should be provided with every avertin kit, and a bottle of the aqueous solution. If required 6 c.c. are slowly administered intravenously followed by 5 c.c. intramuscularly.

The equanimity with which workers with avertin have come to regard a 30 to 40 mm. drop in systolic blood-pressure has received experimental confirmation from the United States of America, where it was shown that the venous oxygen remains within normal limits as opposed to true surgical shock. Ephedrine has come to be relied upon to restore this level if required and also shortens the anaesthesia.

One extraordinary property of avertin recently emphasized by Shipway is that the cough reflex is regained almost as soon as inhalational anaesthesia ceases. Instead of being inadvisable, as one once thought in operations on the upper respiratory passages, avertin is thus perfectly safe and even desirable.
(4) "Avertin has a toxic action on the liver."

Reports are abundant of the successful use of avertin in the presence of jaundice, cholecystitis and hepatitis. McKim and Bourne, of Montreal, have recorded an instance where avertin was administered 22 times in eight weeks to a man of 37 who required multiple dressings. Rabinowitch determined minor deviations in dye, pigment and sugar tolerance tests which on investigation proved to be related to exacerbations of the concurrent infection and not to the number of anaesthetics. Anaesthetists need to be continually reminded that infection is a most potent cause of fatty degeneration of the liver.

(5) "Avertin frequently causes excitement or troublesome restlessness during induction or recovery."

This criticism applies to almost any narcotic and is largely a matter of personal idiosyncracy which is difficult to foretell. It is most commonly seen when small doses are given to nervous patients, e.g. during childbirth, and can be prevented by 1/6 gr. morphia or the immediate use of open ether. It is less commonly seen in avertin than in barbiturate anaesthesia and the general advantage of avertin over this group is its greater constancy of effect.

(6) "Avertin is too troublesome and time-consuming in its preparation."

This, one concludes regretfully, is the real reason for the lessened use of avertin in our busy cities, but is an argument rather characteristic of our own country. There are two methods of overcoming this difficulty: one is to prepare the solution at home and put it in a thermos flask, the other and more debatable method is to allow the senior nurse or matron of the nursing home to give the solution half an hour before the arrival of the anaesthetist and surgeon, the dose having been measured out at a preliminary visit to examine and weigh the patient. This is parallel to the administration of morphia, hyoscine, etc., by responsible nurses but raises a minor legal query. The question of a free airway, possible cyanosis, etc., should be carefully explained, but is essentially the same as that required after the anaesthetist's departure. The favour or otherwise with which avertin is re-
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In conclusion avertin has earned for itself a permanent place in the treatment of convulsive states, including tetanus, where it has been a life-saving measure. It seems to have more constant results and evoke less idiosyncrasies than the barbiturates for whom it has paved an easier way. Its greatest drawbacks in this country are time and expense; at present the latter renders paraldehyde its most serious rival. With regard to its future place in obstetrics I am not qualified to speak. Sales of the drug in Australia, I am informed, indicate that it is still in considerable demand, especially in country areas. No drug in the Pharmacopeia is "ideal" for the purpose for which it is used, and to this avertin is no exception, but I venture to say that the use of avertin will only cease if and when basal narcosis itself is discarded.

Our experience agrees with that of Professor Anschiitz, who in the final paragraph of his book says as follows: "We believe in avertin, because so far we have never had with that drug the distressing experience of an anaesthetic death, nor have we seen a case in which the fatal issue of a correctly-performed anaesthesia was utterly at variance with the pathological condition of the patient and with the operative procedure."

As an interesting addendum to Dr. Maddox's article, we are glad to print the following contribution:

AVERTIN IN OBSTETRICS

By Cecil Coghlan, Sydney.

I FIRST used avertin in obstetrics in 1929 and since have delivered 133 women under its beneficial influence. So satisfied am I, that I now do not conduct a confinement without it or one of the other basal narcotics.

At first I used avertin alone, but for the last 18 months have been using it in conjunction with sodium amytal or