absence of uraemia and tympanitis, and the rapid disappearance of existing tympanitis after administration of serum, are definite indications of its neutralizing action on the toxin.

We have not yet been able to find a suitable method for the titration of the serum. The method of titration on rabbits seems to be too expensive for adoption as a routine procedure.

REFERENCES

¹ Ghosh, H.: *British Medical Journal*, 1935, i, 56.

² Idem: *Comptes Rendus des Séances de la Société de Biologie*, 1933, cxii, 1176.

PENTOTHAL SODIUM IN MENTAL HOSPITAL PRACTICE

BY

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Pentothal sodium (sodium ethyl [1-methyl-butyl] thio-barbiturate) approximates in its action to evipan. It was introduced to this country by Jarman,¹ who has made a comprehensive investigation of its use as a general anaesthetic. An investigation has been undertaken with the object of determining the value of this drug in psychiatry. The cases were chosen arbitrarily, and included all the types commonly seen in a mental hospital. The indications for administration of pentothal sodium were considered to be: (1) to control manic excitement; (2) to induce sleep; (3) to facilitate hypnosis as in narco-analysis²; and (4) to perform various manipulations and minor operations.

Oral Administration

Pentothal is given by the mouth in capsules or in a 10 per cent. solution. Its flavour is sulphurous and rather unpleasant, but far less nauseating than that of paraldehyde. The minimum effective dose varies from 3 to 20 grains, and appears to be governed chiefly by the degree of excitement, and to a less extent by the general physical state of the patient. In all cases it must be given on an empty stomach. Sleep usually ensues within half an hour. The duration of sleep varies greatly, and, as is the case with nembutal,³ is strikingly dependent upon external stimuli. The average duration of sleep was four hours by day and five to seven hours by night. On waking there is quick recovery from the effects of the drug and a pleasing absence of the nausea and headache which follow the use of some hypnotics. Increased restlessness attributable to the drug only occurred in certain maniacal states. There were no other after-effects.

Rectal Injection

In the case of the resistive patient who "will not swallow" there is much to commend rectal narcosis. Pentothal fulfils the first requirement of a rectal narcotic—namely, it is non-irritant to the bowel wall. It appears to fulfil the second requirement of being effective in non-toxic doses. The solution is prepared by dissolving 1 gram of pentothal in 10 oz. of distilled water. It is introduced very slowly into the rectum, the injection taking some five minutes. By this time many patients are drowsy; some express a wish to be left alone; and many fall asleep almost immediately. The duration of sleep, again, shows individual variation, but is usually more prolonged than that induced by oral medication. In some excited patients there is no sleep, the patient becoming drowsy and more amenable. In one case of mania the only effect was to increase the patient's excitement. The

following case illustrates the effect and use of the rectal method.

Case Report.—A single woman aged 64, a paraphrenic, suffered from scandalizing hallucinations and delusions of sexual assault, which made her noisy, obscene, and hostile to all around her. For many years she had been asocial and violently resistive to all attention. She developed an acute infection of the middle finger with a spreading cellulitis of the right hand. Appropriate treatment was very difficult owing to her mental state. She was given a rectal injection of 1 gram of pentothal. Towards the end of the injection she said she felt tired; three minutes later she was asleep. She slept for thirteen hours. The following morning she quietly permitted her hand to be examined and dressed. As a result of this co-operation the spreading cellulitis was arrested.

Intravenous Injection

Pentothal sodium is supplied in ampoules containing 1 gram of the powder. The addition of 10 c.cm. of redistilled water makes a clear, straw-coloured solution. This 10 per cent. solution is suitable for all purposes except narco-analysis, in which a 2½ per cent. solution is more convenient. In all cases the drug is injected very slowly, at a rate which never exceeds 1 c.cm. per minute. The dose is estimated by the individual response, which is far safer than the schematic dosage (by body weight) originally recommended for avertin and evipan.

The effect is almost instantaneous. After 1 c.cm. there is a subjective sensation described by one patient as "floating on air"; others feel tired, and some fall asleep. After 2 c.cm. a few patients become garrulous, but the majority fall asleep. In a series of fifty consecutive cases every patient was in a deep sleep by the end of the third cubic centimetre. There is a further resemblance to evipan in that after the minimum dose the patient regains consciousness almost as quickly as he lost it. Such short anaesthesia is suitable for the performance of minor operations.

When pentothal is used to control mania a larger dose must be given. The injection is continued until deep surgical anaesthesia is produced, whereupon a further equal quantity is injected intramuscularly. This ensures a deep sleep for about an hour, with a further period of lighter sleep for several hours if the patient is undisturbed. This method is sometimes lastingly beneficial.

Case Report.—A married woman aged 41, with manic-depressive insanity, was in the manic phase characterized by persistently noisy, restless, and interfering behaviour. Her conversation was rambling and inconsequent, her language obscene, and her conduct offensive and violent. The usual sedatives had been given without effect. Pentothal was injected, 4 c.cm. intravenously and a further 4 c.cm. intramuscularly. The patient slept for three hours. On waking she was quiet, friendly, amenable, and very apologetic for having used such disgusting language. This changed attitude continued and has been maintained.

Summary

A new and powerful narcotic has been described, with special reference to its use in a mental hospital. It has been administered to patients whose ages varied from 20 to 75 years. It has been used for various purposes and by every known route. The intravenous route would appear to have the widest application, in that it meets all four of the indications mentioned. While there is a noteworthy absence of the difficulties and complications associated with most barbiturates, there is one effect which calls for very great care—namely, a very marked depression of respiration. The obvious safeguard is to maintain an adequate airway. The striking advantages of pentothal are: (1) its smooth induction of anaesthesia; (2) its certain action in facilitating narco-analysis; and (3) the rapid recovery rate, which allows of its use in psychiatric

clinics. This last use of pentothal is to be described in a subsequent report.

I wish to express my indebtedness to Dr. R. Jarman for his very helpful information and advice, and to Dr. P. W. Bedford for his permission to publish the notes of these cases.

REFERENCES

- ¹ Jarman, R., and Abel, A. L.: *Lancet*, 1936, i, 422.
- ² Horsley, J. S.: *Ibid.*, 1936, i, 55.
- ³ Curran, D., and Minski, L.: *Ibid.*, 1932, ii, 126.

Clinical Memoranda

Vagaries of Streptococcal Infections

SCARLET FEVER ANOMALIES EXPERIENCED BY A
SCHOOL MEDICAL OFFICER

The indeterminate position of scarlet fever in the chain of streptococcal infections has again been emphasized by a series of cases treated by me in a large public school in the North of England.

A year ago the school hospital dealt with a small epidemic of thirty cases of infected throats, the usual clinical picture being as follows. The throats were not very sore, but on inspection they were congested, catarrhal, and invariably showed much hypertrophy of the lymphoid follicles of the posterior pharyngeal wall. Cervical adenitis was a constant feature. Throat swabs showed a heavy growth of a haemolytic streptococcus. Irregular pyrexia up to 105° F. occurred, with wide daily swinging; this was usually followed by an apyrexial interval of several days and then another sharp recurrence of fever. There were no rashes and no vomiting, and the coated tongue cleared from before backwards. Various treatments were tried: local treatment with phenate of soda, milton, sanitas, glycer. thymol. co., and Mandl's paint; internal medication with salicylates, aspirin, quinine, and quinsan. No treatment, however, was found of much use except the injection of Evans's polyvalent streptococcal serum.

During each succeeding term there were sporadic cases of a similar type.

The present term has seen a more widespread outbreak at the school. Throat swabs showed streptococci of various kinds. Among the thirty-five cases nine developed typical scarlatiniform rashes with "strawberry" tongues, and after corroboration by the medical officer of health were removed to isolation hospitals. *Two of these cases did not desquamate.*

Of the remaining twenty-six cases ten developed mild and transient punctate erythemata with an atypical distribution—that is, on the lower part of the abdomen, thighs, hands, and feet—with no flushing of the face, no vomiting, and no circumoral pallor. *One of these cases desquamated profusely in due course.*

The remaining sixteen cases made slow progress—relapses being common—and developed no rashes. One case developed a streptococcal septicaemia (clinically typical but with negative blood culture), and after a desperate illness of three weeks eventually recovered.

It is interesting to note that a boy in hospital, convalescent from measles, developed a sore throat, and after several days became acutely ill with erysipelas of the face.

CONCLUSIONS

Scarlet fever remains, as Sydenham said, "a disease in name only." It is only one of the many protean manifestations of invasion by the streptococcus; the streptococcal syndromes appear to overlap each other widely. In this connexion, as in so many other diseases, the resulting clinical picture seems to depend at least as much on the "soil" as upon the "seed."

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Distribution by Movement of Radioactivity in the Treatment of Abdominal Carcinoma

We take it that the problem of the application of radium to an intra-abdominal tumour, especially one associated with lymphatic spread, is to make as much use as possible of methods to overcome the inverse law of radioactivity, which states: the strength of radioactivity is inversely proportional to the square of the distance from the source. Our reason for writing this note is that we have attended certain courses on radium treatment in various countries and towns, and have not seen this particular variation of method used by others (in detail), and put it forward in the hope that it may be an advance in application.

The method of irradiating a tumour by means of radium in a catheter is, of course, quite an old one. We have seen it used in London, Berlin, Paris, and other centres, but that generally adopted has been to implant the end of the catheter containing the radium, or the needle itself, into the region or proximity of the tumour, and to remove it at once when the necessary milligram-hours have been administered. We see no reason for this sudden removal, and think that the gradual removal by retreat will give a greater area of irradiation. Our point is that little benefit can be expected from the method of sudden removal outside a circular area of one or two inches radius. There is also a danger of an overdose necrosis at the centre.

We feel that mobility of the source of radiation by traction should give better results. It will minimize the danger of local necrosis, and the process, we find, is not accompanied by much pain or excessive discomfort, when carried out with the special eyeless catheters supplied to us by Allen and Hanburys Ltd. The method we used is as follows:

A central laparotomy incision is made in the ordinary way, which need only be quite a small one, and the growth localized. The left hand, wearing two gloves, is introduced into the abdomen; the tips of the index and middle fingers give the exact point internally for the introduction of the trocar and cannula through the abdominal wall. The point of the trocar is received between the points of the fingers mentioned, the back of the hand retracting and protecting the abdominal contents.

The trocar is then removed, and the catheter, containing the radium at the tip, is pushed through and drawn well into the abdomen. A little adjustment will allow of bringing the point into the required position. The cannula is then removed, leaving the catheter in position, the whole manoeuvre necessitating only a few moments.

In this way twenty-four catheters may be introduced in a very short space of time, and it is not within the scope of this note to describe the exact positions of the radium, which will vary in each particular case. The principle is, of course, to place the tip of the catheter in such a way as to be drawn along the area of the lymphatic spread and the neighbourhood of the tumour.

Instructions are given to the nurse to withdraw the catheters one inch every three or four hours, and in this way the catheters are removed in about four days' time. The radium needles are inserted into the catheters threaded with long silk to help to remove them from the lumen when taking them out.

We feel that our results justify us in adopting the method in all cases of inoperable carcinoma and in conjunction with operation where removal may be followed by secondary lymphatic spread. The principle of traction radiation could be employed in other regions of the body and not only in the abdomen. It might be used, for instance, in carcinoma of the breast, where wide distribution is required. A point to consider is the economic factor. A small amount of radium can be used to irradiate a large area with guaranteed efficiency, excluding again the danger of local necrosis.

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