fundus and may be abolished by infiltrating the area of skin involved. This pain is probably an example of peritoneo-cutaneous radiation.

The local anaesthesia is effective for three to eight hours, and the fact that it has been found possible to ensure absolutely painless childbirth proves the truth of Mackenzie's theory of referred pain so far as the uterus is concerned, and at the same time offers the hope that an improved technique will ensure painless childbirth without any risk to the mother or the child, and without the continuous attendance of an anaesthetist.

Summary

1. Stimulation of the autonomic nerve endings in the cervix by silver nitrate causes a referred pain appreciated in the area of the skin supplied by branches of the first lumbar nerve. This pain may be abolished by local anaesthesia.

2. Dysmenorrhoea is largely, if not entirely, a referred pain appreciated in the area of skin supplied by branches of the first lumbar nerve, and the pain may be abolished by local anaesthesia.

3. The pain in the lower abdomen and the lateral backache of labour are manifestations of viscerosensory referred pain appreciated in the area of skin supplied by the first lumbar nerve. The sacral backache of labour is a pain referred from one somatic nerve to others of the same spinal segments.

4. While it is too early to be dogmatic there seems every reason to believe that a simple and safe technique can be evolved to render childbirth painless.

I am much indebted to Dr. John Kirk of University College for his help and demonstrations, and for allowing me to make dissections on the cadaver; and to Professor James Young for the opportunity of carrying out this investigation on patients admitted under his care. I wish also to thank Sir Frederick Menzies for permission to refer to patients admitted to the hospital services under the control of the London County Council.

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R. Dupérié, A. Fontan, J. Dubarry, and R. De Lachaud (*Gaz. Hebdomadaire de Médecine de Bordeaux*, September 20th, 1936, p. 597) record the case of a man aged 29, inoculated against typhoid fever nine years previously, who developed a severe attack of typhoid complicated in convalescence by a purulent pleural effusion, from which *B. typhosus* was cultivated, followed by paralysis of the left half of the diaphragm due to neuritis of the phrenic nerve. In a few days, however, the paralysis diminished and then disappeared. Further recovery was uneventful. Pleurisy is an uncommon complication of typhoid fever, occurring in only about 2 per cent. of all cases, and empyema is extremely rare and dangerous. The fluid was at first puriform and sterile, but on the fourth puncture intracellular and extracellular typhoid organisms were found.

R. J. H. Silvestre (*Thèse de Paris*, 1936, No. 693), who records two illustrative cases in a girl aged 15 and a woman aged 31, states that Parkinsonism in typhoid fever may occur in one of two ways. In the first place it may develop rapidly during typhoid encephalitis without in any way aggravating the course of the disease. Although this is always of a severe and often fatal character, if the patient survives complete recovery takes place. In the second type the Parkinsonian syndrome pursues a slower course, with successive aggravations of the condition which may prove fatal. But if the patient survives the attack of typhoid fever the syndrome persists, although it is always incomplete and is often very slight in character.

PENTOTHAL SODIUM ANAESTHESIA

BY

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Pentothal sodium is the most recent of the barbiturate intravenous anaesthetics, and with its introduction a distinct advance has been achieved. I have just completed one hundred personally conducted and selected cases. Stress must be laid on "selected," because one should always be particularly careful when using new anaesthetics, especially intravenous anaesthetics, for the first time. Having carefully digested the very helpful articles by Dr. Ronald Jarman and Mr. A. Lawrence Abel (*Lancet*, February 22nd and March 14th, 1936), I started off fully confident that pentothal sodium was well worthy of a trial. The appended list of cases in which I have used pentothal, either alone or in conjunction with gas-oxygen or ether, will demonstrate that a large variety of cases have been dealt with in this series.

From the beginning it was apparent that induction was smoother and quieter; the yawning and twitching which sometimes accompany induction by evipan sodium were absent. Administered at the rate of 1 c.cm. every twenty seconds, I find that considerations of age, weight, and physique being equal there was a wide range in the dose required to reach the stage at which patients no longer answer questions; this dose varied from 1.5 c.cm. to 4.5 c.cm. The dose necessary to produce surgical anaesthesia also varied considerably; sometimes 2 c.cm. sufficed, while on two occasions 10 c.cm. were totally inadequate for even minor surgical operations.

As anaesthesia deepens the pulse becomes accelerated and the pupils dilate, but both pulse and pupils soon return to normal. Respiration, except for some shallowness, remains unchanged; this shallowness, accompanied by slight cyanosis, becomes very marked if the injection is given too rapidly. A clear and unimpeded airway is an absolute essential. Oxygen should always be at hand, and if necessary used by itself or in conjunction with carbon dioxide. So far I have never had to fall back on either of these. In two cases in which there was some cyanosis with marked shallowness of respiration the surgical incision stimulated the patient to normal but quick respiration, with immediate return of colour. In operations of short duration—for example, teeth, tonsils, abscesses, etc.—not requiring that depth of anaesthesia necessary for abdominal relaxation, a little experience will soon enable the anaesthetist to gauge to a nicety the minimal dose required for each case. This is important, as it means a very rapid return to consciousness; most patients appreciate this. I find that recovery after pentothal administration takes place more rapidly than when evipan has been used, and there is no post-anaesthetic restlessness. In these cases, providing that no specific contraindications exist, pentothal can be used with absolute safety.

Use in Abdominal Surgery

In abdominal surgery I have used pentothal in twenty-three cases—twelve appendicectomies, five herniotomies, five cholecystectomies, and one case of bowel resection.

Eight of the twelve appendicectomies and three of the five herniotomies were done under pentothal alone; the others required a small supplement of ether. For the gall-bladder cases and bowel resection pentothal was only used as a basal anaesthetic, 5 c.cm. being given in each case. When pentothal alone is used in abdominal surgery I find that occasionally traction on the peritoneum or manipulation of the bowel causes a slight hiccup; a

few whiffs of ether eliminate this very quickly. Muscular relaxation is generally quite satisfactory.

As a basal anaesthetic I consider pentothal superior to evipan; the induction is smoother and, as the anaesthesia is somewhat deeper, the cough reflex disappears more readily, hence the addition of ether is much less likely to start coughing or spasm; 5 c.cm. is an average dose. As with other basal anaesthetics less ether is required and therefore recovery is more rapid.

So far I have not tried the method worked out by Dr. Lundy, which as follows.

Half an hour before operation give 1/6 to 1/8 grain morphine and one capsule (1½ grains) of nembutal. Dissolve the content of the No. 8064 ampoule of pentothal (0.5 gram) in 10 c.cm. of sterile distilled water. Inject 1 c.cm. of the solution intravenously; after fifteen seconds again give 1 c.cm. This should produce anaesthesia lasting from five to eight minutes. If the patient begins to move his fingers or toes or phonates slightly this is an indication for another 1 c.cm., unless the operation is nearly completed, in which case only 0.5 c.cm. need be injected.

Dr. Lundy speaks very highly of this technique; it is obviously worth a trial. Personally, I dislike mixing the barbiturates, even in small doses, especially in conjunction with morphine. I have, however, on a few occasions used repeated doses. My experience, both with pentothal and with evipan, is that the second dose should be as small as possible.

One of these cases caused some worry after the operation. I had given an initial dose of 9 c.cm. for an extensive vaginal repair. There was no undue fall of blood pressure, the respirations were quiet but not shallow, and the colour was good. After fifteen minutes the patient showed signs of coming round by movements and return of corneal and conjunctival reflexes. I injected a further 5 c.cm. Recovery did not take place for over one and a half hours, and coramine had to be administered. This patient seemed to relapse into deep anaesthesia after her return to bed. Probably what applies to evipan also applies to pentothal—namely, that a patient whose reflexes have returned and who is moving about restless and muttering while still in the operating theatre sometimes on return to bed relapses into as deep if not a deeper degree of anaesthesia, lasting sometimes for one-half to one hour. I have had this happen after

a dose of 5 c.cm. of evipan given for dental extractions; in that case there had been no premedication. For this reason I think it necessary again to stress the fact that the repeated dose of any intravenous anaesthetic should be as small as possible.

Conclusion

1. Pentothal gives a smooth and pleasant induction to anaesthesia.

2. Dose for dose, pentothal gives a deeper degree of anaesthesia than evipan sodium.

3. Respiratory depression is more pronounced with pentothal than with evipan.

4. Recovery is more rapid with pentothal than with any other barbiturate.

5. A greater variety of surgical operations can be performed with pentothal than with any other short-acting barbiturate.

6. The same contraindications exist for pentothal as with other barbiturates.

7. All intravenous anaesthetics, but especially pentothal, require the constant attention of a skilled anaesthetist. In unskilled hands their use is dangerous, and not to be recommended.

8. Care should be taken that pentothal is not injected into the tissues—a painful reaction may result.

Clinical Memoranda

A Problem in Diagnosis

I would like to record the following case because of the difficulties it presented in diagnosis, and because of some interesting findings:

CASE REPORT

A man of 50 years of age was admitted one midnight to hospital under my care as the result of an accident, when he was knocked down by a motor car; the history was vague, but he apparently was not run over. On admission he was very drunk; he was shocked, but not profoundly so; he complained of no pain. He had a deep scalp wound down to the pericranium, which necessitated ten stitches; he had superficial wounds of the right eyebrow and the left hand, and a deep lacerated wound of the right leg. This last was excised and stitched, and he was given 1,000 units of anti-tetanic serum and 4,000 units of anti-gas-gangrene serum. There were no physical signs in his nervous system.

The next morning he appeared comfortable; he was perhaps rather drowsy. He complained of nothing. His temperature was 97.2° F. and his pulse rate 76 per minute. That evening he complained of umbilical pain and an inability to pass urine. On examination his abdomen was guarded in the lower half, but not really rigid, and was tender; there was no distension. There was a swelling in the hypogastrium which was dull on percussion, and was presumed to be bladder. He was catheterized quite easily with a soft rubber catheter; at first a gum-elastic catheter was used, but some difficulty was experienced in passing this, and a certain amount of trauma was presumed to have been done to the posterior urethra because there was a little bleeding from the penis following this attempt, and the urine was faintly blood-stained. Thirty ounces of urine were removed slowly, and the patient experienced immediate relief, though he said that the pain had not entirely disappeared. His temperature and pulse rate were still normal.

The following day, as there was continued inability to pass urine, a soft rubber catheter was tied in the urethra, and in the course of the day 60 oz. of urine, which was perfectly clear, were drained away. His general condition seemed to be improving and his pain was less. His temperature and pulse rate were still normal.

The following day the catheter was removed, and as he still could not pass his urine it was decided to catheterize him thrice daily. Sixty ounces of urine were drained from the catheter this day. But his general condition was not so good; he complained of abdominal pain, and was vomiting

Table of Cases

Operation	Number of Cases	Doses of Pentothal	Supplementary Anaesthesia
Dental extractions ...	25	1.8 c.cm. to 5 c.cm.	None
Tonsils	2	2 c.cm. to 5 c.cm.	"
Nasal septum	5	8 c.cm. to 5 c.cm.	"
Antrum of Highmore	6	8 c.cm. to 10 c.cm.	"
Dislocations	2	5 c.cm. to 8 c.cm.	"
Fractures	8	6 c.cm. to 10 c.cm.	"
Amputations	2	10 c.cm.	"
Abscesses, etc. ...	8	3 c.cm. to 10 c.cm.	"
Curettage	9	8 c.cm. to 10 c.cm.	"
Vaginal repair ...	4	6 c.cm. to 14 c.cm.	"
Appendicectomies ...	12	10 c.cm.	Ether in 4 cases
Herniotomies	5	10 c.cm.	" .. 2 cases
Resection of bowel ...	1	5 c.cm.	" .. 1 case
Gall-bladders	5	5 c.cm.	" .. 5 cases
Exophthalmic goitre	1	8 c.cm.	Gas and oxygen
Implantation of radium needles	5	6 c.cm. to 10 c.cm.	None
	100	(Fatalities nil)	