undoubtedly some degree of dementia, but this may have been present before her original breakdown became acute over two years ago. She dates everything from the year 1938, the year she started her illness. She also states that she had no idea that she had been under my care for two years.

Case 7.—A youth aged 18 came to me a few weeks ago. He was a typical early case of schizophrenia, and was restless, frightened, and deluded. He stated that he had committed a serious crime and wanted to hand himself up to the police. He had apparently been wandering about aimlessly at home and was a cause of great anxiety to his parents. On the day of his first visit to the institute he was under the impression that I was taking him to the Old Bailey. After three shocks he became more reasonable, and now, after ten shocks, he is practically back to his normal. He no longer looks terrified. His conversation is rational, and he appears to be bright and cheerful, such as one would expect from a boy of his age. He readily agrees that he had been behaving absurdly and that he had talked a lot of nonsense. It is assumed that after a few more shocks, making a total of fifteen to twenty, he will be able to return home. He has put on a stone in weight since admission.

Conclusions

I think it as well to classify the results of the above cases from the social standpoint, according to the degree of remission achieved, as follows. **Class A:** a complete return to normality and ordinary social intercourse outside a mental hospital. **Class B:** a marked improvement in behaviour, sufficient to permit the patient to enter into the higher spheres of mental hospital life. **Class C:** no change, the patient still requiring constant attention. Cases 1, 2, 5, 6, and 7 can be placed in Class A, although Case 6 may be a candidate for Class B, as this patient shows signs of dementia to a small degree; but she is quite suited to spend the eventide of her life at home with her husband. Cases 3 and 4 are at present in Class B, but would appear to be not far off the Class A standard.

It will be seen that the results are entirely satisfactory, admitting at the same time that the cases were specially selected for treatment. Except for the period of the "freeze-up," when it became impossible for me to transport these patients to the institute, they have all been treated with three shocks a week. The fact that shocks were administered three times weekly may be of some importance, since other groups of cases which received only two shocks a week have not fared so well. It is possible that the method of Sogliani (1939a, 1939b), who gives several shocks a day, may produce even better results in patients of suitable physique. When shocks are given only twice a week one has a definite impression of "missing the boat" by reason of the long interval.

The great advantages, in my opinion, over other forms of convulsion therapy are:

1. The patient suffers no unpleasant memories.
2. The loss of consciousness is instantaneous as soon as the lever is pressed.
3. The possibility of fractures seems to be remote, provided certain precautions are taken. The precautions are: (a) A suitable resilient gag is placed between the teeth (of course after any dentures have been removed). The best article is a rubber ring, such as is sold at dog requisites shops; this keeps the tongue away from the teeth, and also has a certain amount of "give" during the tonic stage of the convulsion. (b) The patient should be lying flat on the back, so that the possibility of a compression fracture of the bodies of the vertebrae is lessened. It was found that a resistive patient often would not lie flat after the insulated electrodes had been placed around the forehead. To overcome this a small non-convulsive shock was administered which made it possible for the patient to be straightened out and the gag placed in position, when the major shock was given.

4. The willingness of the patient to co-operate in this form of treatment after the first two or three shocks.

5. The celerity of the treatment. The patient can be treated in his everyday apparel, provided any constricting clothes are loosened around the neck and chest and the footwear is removed.

6. The appetite is definitely stimulated and the body weight rapidly increased.

7. The chronic constipation associated with these types of psychosis disappears early in the treatment.

8. The portability of the complete apparatus.

9. The manipulator need not be a highly qualified electrical technician.

Although the ultimate prognosis of this form of treatment is problematical at the present time, there seems no reason why the remissions should not be prolonged indefinitely by "maintenance" shocks—say three in a single week—if the patient is found to be relapsing. I feel certain that patients would submit to this far more readily than they would undergo the terrors of cardiazol or insulin; besides, this could be undertaken in their own homes, provided suitable electricity were available. The contraindications to shock treatment would seem to be arterial and cardiac diseases, high blood pressure, and intracranial diseases.

Summary

The treatment of certain suitable cases of psychosis by electrically induced convulsions is discussed.

Records are given of seven selected cases which received shock treatment for various psychotic disorders.

The results of the use of this method are classified and its advantages over other forms of convulsion therapy are enumerated.

I am deeply indebted to Professor F. L. Golla, the director of the Burden Neurological Research Institute, Bristol, for the courtesy shown me, to Mr. Grey Walter, and to the staff of the Institute, who have given me every facility in the treatment of the patients whom I have taken there.

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AXIAL ROTATION OF THE PREGNANT UTERUS

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The diversity of lesions which, in the pregnant woman, may cause acute abdominal pain with uterine tenderness and rigidity, vomiting, and increasing prostration, was stressed by Barnett and Harris in the *Journal* for July 22, 1939 (p. 167). Wide though this diversity may be, the essential point is to determine, so far as possible, whether the lesion is extra-uterine and therefore probably requiring surgical intervention, or intra-uterine and perhaps amenable to sedatives or to some obstetrical measure. There must remain, however, cases in which the diagnosis is in doubt until laparotomy is performed, and an occasional case in which the lesion, though uterine, must be dealt with surgically.

Such lesions as perforated peptic ulcer, acute pancreatitis, and acute cholecystitis can usually be recognized by their distinctive features. Barnett and Harris found, however, that pregnancy complicated by acute suppurative intra-abdominal lesions, though uncommon, is likely to lead to diagnostic uncertainty because of a superficial resem-

blance to concealed accidental haemorrhage, even to the apparent rising of the level of the fundus uteri. Fortunately it is seldom that such a distinction has to be made, but I am prompted to report a case of axial rotation of the pregnant uterus which illustrates still another lesion in which a diagnosis of concealed accidental haemorrhage could only be excluded with difficulty.

Although minor degrees of torsion of the longitudinal axis of the pregnant uterus are probably not uncommon, progressive and persistent torsion sufficient to produce constitutional symptoms and to require laparotomy for its correction appears to be less frequent, for there is no recent record of such a case in the literature.

Case Record

Clinical History.—The patient, a healthy primigravida aged 30, had had a hitherto uneventful pregnancy, there being no evidence of hypertension, albuminuria, or other abnormal features. On December 1, 1938, when approximately thirty-three weeks pregnant, she began to suffer from severe generalized abdominal pain, and uterine tenderness which, however, was not localized. The onset was gradual, with some vomiting, weakness, and faintness, but no actual collapse. There was no history of any recent strain, twist, or fall, nor was there any haemorrhage per vaginam. Previous examination had shown the child to be presenting by the vertex as an L.O.A. At the onset of the pain these negative findings in regard to possible malpresentation, hypertension, or albuminuria were confirmed. Symptomatic treatment, including sedation by morphine, gave some relief. There was no worsening of the general condition and little change in the clinical picture. By December 5, however, the abdominal pain and uterine tenderness had become constant in spite of sedatives, the outline of the uterus was clearly definable through the abdominal wall, and the whole organ was tense and tender, but there were no rhythmic contractions or other signs to suggest that labour had begun.

On the basis of a provisional diagnosis of concealed accidental haemorrhage, and with the intention of inducing labour, the membranes were artificially ruptured and a considerable quantity of liquor allowed to escape. Not only did the patient fail to come into labour, but the uterine pain and tenderness increased and the foetal heart sounds could not be detected. She was now becoming considerably distressed, though her general condition remained satisfactory and there was no unequivocal evidence of internal haemorrhage. After a further short period of sedative treatment she was admitted to the Brisbane Women's Hospital. Her condition generally was as described above—the uterus standing out even more prominently through the abdominal wall. There was no evidence of a retraction ring. The cervix uteri was not thinned out, there was no dilatation of the os, and the presenting part was not engaged. There was no bleeding per vaginam.

Operation.—It was decided that the only effective treatment at this stage would be by laparotomy and Caesarean section, even though no positive pre-operative diagnosis could be made. In spite of the ruptured membranes an abdominal incision as for the classical operation was used, since it was felt that the operative measures to be adopted would depend largely on the findings revealed by laparotomy. This choice of incision was a fortunate one, as the first structures presenting in the wound were the left Fallopian tube, the left round ligament, and the left lateral aspect of the uterus. The gravid organ itself was tense but not markedly congested. The condition was evidently an axial rotation of the pregnant uterus in its longitudinal plane, the direction of rotation being clockwise and the extent approximately 90 degrees. The actual site of the torsion was apparently in the lower uterine segment. The correction of the condition was facilitated by everting the pregnant uterus. This manoeuvre, moreover, in combination with the subsequent packing off of the peritoneal cavity, made the classical operation reasonably safe in the circumstances. As now expected, there was no evidence of concealed accidental haemorrhage or other abnor-

malty than the one described. There was about 50 c.cm. of free blood-stained fluid in the pouch of Douglas.

The child was delivered alive and, although obviously premature and suffering from asphyxia pallida, it responded satisfactorily to the routine treatment for such cases. It died, however, some twelve hours later. The patient herself made an entirely satisfactory recovery, complicated only by a saprophytic type of intra-uterine infection, as exhibited by a pyrexia rising to 102° F. and a profuse offensive lochial discharge during the third to fifth days of the puerperium.

Discussion of Aetiological Factors

The aetiological factors in such a case as this must remain a matter for conjecture. A soft thin-walled lower uterine segment, laxity of the supporting ligaments and abdominal wall, in combination with excessive movements of the foetus, uterine obliquity, or the presence of an asymmetrical uterine fibroid, could conceivably induce such a condition. Moreover, if in the same circumstances the mother habitually lay on her right side some degree of clockwise axial rotation could possibly occur. If any such factors, however, were alone sufficient the condition would obviously occur more often. An analogy with the torsion of a large ovarian cyst does not cast much light on the matter; for morphological considerations, such as the presence of supporting ligaments and the width of the pedicle relative to the size of the tumour, make the two conditions hardly comparable.

Differential Diagnosis

In differential diagnosis the main possibilities receiving consideration were as follows:

Concealed accidental haemorrhage was suggested by the presence of uterine pain and tenderness in association with some nausea and vomiting at the onset. It was negated, however, by the absence of any signs of hypertension, albuminuria, oedema, or other evidence of toxæmia. Furthermore, the uterine tenderness was never localized, and the subsequent course of events had little in common with the clinical picture of a concealed intra-uterine haemorrhage.

The points in favour of a diagnosis of *tonic contraction* were limited to the presence of progressive uterine pain and tenderness. Against such a possibility are clearly the facts that at no stage was the patient obviously in labour, there was no evidence of malpresentation, no fixation of the presenting part, and no retraction ring, and the progress of events was entirely different.

The changes occurring in a *necrobiotic fibromyomatous tumour* are well known as a source of acute abdominal pain during pregnancy—a pain often associated with nausea and vomiting. But the pain, and certainly the tenderness, remain localized in such a condition; the tumour may or may not be palpable, and the onset of the pain is usually more sudden than in this case.

Acute hydramnion was also considered, for the rapid accumulation of an excessive quantity of liquor amnii, though comparatively rare, leads to much abdominal discomfort if not actual pain—nausea is often present, and the outline of the uterus may stand out markedly. Nevertheless, other evidence in this case was not consistent with a diagnosis of acute hydramnion.

The masking of the classical symptoms and signs of *acute appendicitis* in late pregnancy is well known, and this possibility had to be considered. It was excluded on the localization of the tenderness to the uterus itself, the absence of any toxic features about the case, and the general impression that the source of the trouble was uterine rather than extra-uterine.

Discussion of Treatment

Treatment of this case was essentially expectant in the first instance. The artificial rupture of the membranes

made the subsequent Caesarean section somewhat more hazardous, but the eventration and packing off of the intact organ reduced the risks of peritoneal soiling.

In view of the fact that the case was suspect, and bearing in mind the difficulties of the lower segment operation under the circumstances, would it have been permissible simply to correct the torsion, establish the viability of all parts of the uterine wall, close the abdomen, and bring the patient into labour by means of a medical induction? However, there being no guarantee that the torsion would not recur, such a procedure would surely have been unjustifiable in this case.

My acknowledgments are due to Dr. K. Wilson, obstetrician to the Brisbane Women's Hospital, for permission to publish this case, and to Dr. Bogle of Beaudesert for supplying the details of the initial stages of the condition.

Clinical Memoranda

Absorption of Iron

As noted in an editorial on Kaschin-Beck's disease in the *British Medical Journal* of March 23, 1940 (p. 490), Hiyeda (1939) found surprisingly large amounts of iron in the blood of patients living in the endemic area. He attributed this to the fact that the water of the wells was contaminated with iron, and to confirm this supposition he made experiments on men and animals in which inorganic iron was administered continuously. He reported that the blood iron rose gradually, reaching a point almost two or three times the normal—for example, 123 mg. per 100 c.cm.—after about a fortnight and later decreasing again. These results are strongly opposed to orthodox teaching, according to which iron is absorbed in the serum, in minute quantities only detectable by the most refined technique (Starkenstein, 1934), and the red cells are impermeable to iron (Schultze, 1940). On reading Hiyeda's paper some weeks ago we therefore carried out the following experiment:

Blood iron was estimated in a normal subject on a mixed diet before and after the administration of a massive dose of iron, and also at intervals of a few days during a twenty-eight-day period in which 900 mg. of citrated ferrous chloride was being taken daily. The titanous chloride titration of Klumpp (1934) was employed, and duplicate estimations were made, agreeing in all cases within 0.5 mg. per 100 c.cm. of blood. To exclude gross changes in the haemoglobin level Haldane's method was used.

The iron content of the blood was determined on three occasions before any iron was given, and found to be 58.3, 57.8, and 56 mg. per 100 c.cm. On the first day of the experiment a dose of 1,500 mg. of citrated ferrous subchloride, containing 0.5 gramme of iron, was taken, together with the juice of an orange. For the rest of the experimental period 0.1 gramme of iron was taken thrice daily in milk. The results are shown in the table.

Day of Experiment	Blood Iron mg. per 100 c.cm.	Haemoglobin per cent. Haldane
9.15 a.m.	56.0	112
9.30 a.m.	0.5 gm. of iron by mouth	
1 { 10.30 a.m.	54.9	112
1 { 12.30 p.m.	55.1	112
1 { 2.30 p.m.	54.7	114
1 { 5.30 p.m.	54.1	112
2	55.2	114
4	56.0	112
10	55.2	—
14	59.9	104
21	58.8	112
28	60.0	112

It will be seen that although the blood iron fluctuated through a range of 6 mg. per 100 c.cm. before and during the experimental period, there was no suggestion of the gross increase in blood iron observed by Hiyeda. He gives no account either of the method which he used in estimating iron or of the conditions under which his experiment was carried out. In these circumstances it is not possible to suggest any explanation for the complete discrepancy between his results and ours; it must, however, be pointed out that our findings are in accord with accepted views on iron absorption and transportation.

Summary

In an experiment designed to test Hiyeda's observation of a two- or three-fold increase in blood iron as a result of iron administration it was found that no significant alteration in blood iron occurred either after a single massive dose or in the course of continued administration of iron.

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Staphylococcal Meningitis Treated with Sulphapyridine: Recovery

The following case is of interest in that, although the sulphonamides are generally considered to be without effect in staphylococcal infections, recovery ensued with marked rapidity in a condition which is usually of great severity and carries a high mortality rate.

CASE REPORT

A soldier aged 20, who had never had any serious illnesses in the past, was admitted to the Slough Emergency Hospital on March 30, 1940, with the history of a sore throat a fortnight previously and sudden illness the day before admission, with malaise, headache, sweating, and pains in the knees, thighs, neck, shoulders, and right wrist. On examination he was sweating profusely, but was afebrile; the pulse rate was normal and no abnormal physical signs could be elicited. It was thought that the condition might be rheumatic; but there was no improvement with salicylates, and the blood sedimentation rate and white count were both normal. The next day his temperature rose rapidly to 102° F. without a coincident rise in the pulse rate, and his headache became much worse and was followed by a generalized convulsion. Lumbar puncture revealed that the cerebrospinal fluid was turbid, and while awaiting the bacteriological report sulphapyridine was given, being continued four-hourly (initial dose 2 grammes, followed by 1 gramme, to a total of 25 grammes). Within a few hours the examination of the cerebrospinal fluid showed 1,070 polymorphonuclear leucocytes per c.mm., with a prolific growth of staphylococci. As it was clear from the temperature chart and the patient's general condition that he was rapidly improving it was decided to continue with the sulphapyridine. In two days the headache and other symptoms had entirely gone, and within five days the cerebrospinal fluid had returned to normal in all respects.

Although there is, of course, no proof that recovery in this case was in any way associated with the use of sulphapyridine, yet the dramatic result suggests that this was not an instance of *post hoc, ergo propter hoc*.

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