INDICATIONS AND CONTRA INDICATIONS FOR E.C.T.

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E.C.T. stands for 'Electrical Convulsant Treatment' or 'Electro-convulsive Therapy.' In America the term 'Electro-shock Therapy' (E.S.T.) is generally used. The treatment consists in passing an electric current through the skull between electrodes placed on the temples. The current is of such a strength that a major convulsion ensues, unless precautions are taken to avoid it. This sounds much more alarming than it is. And while to throw a patient into convulsions is an extraordinary form of treatment, it can also be a very effective one. Indeed, its value is indisputable. The terms E.C.T. and E.S.T., with their alarming stress on shocks and convulsions, are unfortunate. For this reason the term 'Electroplexy' is often used as an alternative. The writer prefers the still simpler 'electrical treatment,' which stresses the therapeutic aspect and does not alarm the patient, since electricity is familiar enough not to be frightening, while still mysterious enough to most people to convey an encouraging suggestion of science allied to magic. Although there are still misconceptions to the contrary, there need in fact be nothing alarming about the treatment, either to those who give or receive it. It is exceedingly safe, and carries little more risk than of being run over in the street. Nor should there be any complications of note, save in very exceptional cases.

Development

The foundations were laid by von Meduna in 1933. On studying the records of a large number of cases in hospital in Budapest, he was struck by the low incidence of epilepsy in schizophrenics and by the rarity of schizophrenia in epileptics. He found this sufficiently striking to formulate the hypothesis that the two conditions were 'biologically antagonistic' to each other. The corollary was that to induce fits in a schizophrenic might be to produce improvement in the schizophrenia. Subsequent events have suggested that, however unsound the theory, the practice is justified by the results. Since the main effect of the treatment

seemed to be in clearing those disorders of the mood, whether of excitement or depression, with which schizophrenia is often associated, it came to be used in cases of mood disorder, whether associated with schizophrenia or not. Increasing experience led to its even wider use on a symptomatic basis. The fits were at first induced chemically, usually by the intravenous administration of camphor in some form. Later, as the value of the treatment became established, alternative techniques were sought and in 1937 Cerletti and Bini devised a machine for inducing fits electrically. These are more easily given, are less severe and produce fewer complications, so that this has become the method of choice. In the realms of electrophysiology much work is still continuing in search of the best modifications in the use of different types of current, etc., but the existing machines, though capable of refinement, provide an effective therapeutic agent. There remained a small group of patients, however, whose physical disabilities disqualified them from receiving this treatment in its ordinary form. Since the second world war attention has been paid to the problem of so modifying or abolishing the actual fit as to make the treatment virtually without physical hazards. This has been achieved by the introduction of muscular relaxants, either derivatives of curare or polarizing agents which prevent the peripheral spread of the electrical impulses to the muscles. These are given intravenously before the current is applied. A short-acting barbiturate is usually given at the same time so that unconsciousness spares the patient from the disagreeable sensation of being paralysed. In this way the fits are so far abolished or attenuated that there are hardly any physical contra-indications. Artificial inflation of the lungs is, of course, necessary until the effect of the relaxants has worn off; but this is only over a matter of a few minutes.

Modus Operandi

As has been said, the treatment was begun on an empirical basis. Later, explanations of its

efficacy were sought in psychological terms, such as that it satisfied a desire for punishment, allowed expiation of guilt-feelings, or was a symbolic re-birth after death. These have been discarded, except by a few devotees of psycho-analysis, and the author of an annotation published by *The Lancet* on March 13th, 1954. There is now no doubt that the treatment works through essentially physical effects, presumably on hypothalamic centres and including the pituitary gland, and by stimulating the regulating and defensive mechanisms of the body, although in a non-specific way. (Delay (1946); Idem (1948); Hill (1949); Altschule (1949); Roth (1952); Idem & Rosie (1953); Spiegel & Spiegel-Adolf (1953)). The fit itself is not an indispensable part of the treatment, the success of which seems to depend merely on the passage of the current. The consensus of opinion is that currents of less than convulsant strength are inadequate in their effects.

General Effects

At the physiological level, the general effects of the treatment are to improve disturbed sleep, to encourage appetite, to assist in regaining weight, and frequently to restore the regularity of menstruation. At the psychic level, it has the contrasting effects of exerting a sedative action in states of excitement, and an enlivening action in states of depression. All this is only true of cases suffering from particular conditions that are about to be described. The treatment should not be applied, therefore, with a view to improving any of the above symptoms individually.

There may also be certain untoward effects of a mild sort. These are described in the paragraph on complications.

Indications

Any treatment that offers hope is bound to be widely used, especially if, as this one, it is symptomatic rather than specific. The wider the use the greater the chances of failure. Electrical treatment has been used at one time and another in almost every type of psychiatric syndrome, and with varying degrees of success in various so-called psycho-somatic disorders. The results have not always been such as to enhance its reputation. It is proposed to consider here only those conditions in which it has proved indisputably of value. These may be considered under the headings of:

- (1) States of excitement.
- (2) States of depression.
- (3) Confusional states.

(1) *States of excitement.* This term is used to indicate those conditions in which the patient is mentally and physically over-active in a sustained way that may last for weeks or even for months.

(a) In schizophrenia. Such states may usher in, or occur in course of, a schizophrenic illness. Any excited schizophrenic is likely to require detention in a mental hospital, but once he is there electrical treatment is likely to be useful for its sedative effect. It may have to be given daily for several days, or even more than once a day, according to the severity of the excitement. It is of value not only in calming the patient so that he is more easily nursed, but in allowing him a much greater approximation to normal life and liberty than would otherwise be possible. Excitement in schizophrenia is, on the whole, a favourable prognostic sign, and a number of such cases may clear dramatically. More chronic cases may be helped over excited phases, and be kept at a greatly improved level of conduct, by courses of electrical treatment given at intervals.

(b) In manic-depressive psychosis, manic phase. Here the excitement may range from hypomania to full mania. In the former the patient will show some degree of over-activity and over-talkativeness with diminished restraint, so that he is over-familiar with strangers, extravagant, interfering and distractible, self-assertive and quarrelsome, usually with diminished sleep and diminished sexual restraint. In mania, he may show speech accelerated to the point of flight of ideas, with wild restlessness so excessive as to lead to exhaustion, often with violence, while there may be total insomnia and sexual shamelessness. In these conditions the sedative effect of electrical treatment is also of value, though, again, it may have to be given daily for many days or even more than once a day. The effects of the treatment are, however, less striking than in cases of depression, for the tendency is to render the excitement more manageable rather than actually to cut it short.

(2) *States of depression.* There has long been dispute over the classification of depressive states. Early in this century there were considered to be two main kinds, reactive and endogenous. Reactive depressions were those in which the patient, commonly with a neurotic personality, reacted with depression to events that he found stressful. Endogenous depressions, on the other hand, were illnesses *sui generis*, which occurred in the absence of outside cause, presumably through constitutional pre-disposition, though sometimes also precipitated by stress. From 1926 onwards the belief gained ground in this country that distinctions between reactive and endogenous depressions were fallacious, so that many came to consider differentiation impossible. Since the introduction of electrical treatment, however, there has been some return to the older view. This reversion has arisen mainly from the results of treatment. Most authorities now agree that endogenous de-

pressions are benefited by this treatment, but that reactive states are not. Whether this is so or not, it is now possible to predict with reasonable confidence what will be the results of electrical treatment, in the light of the symptomatology. There is a certain basic depressive syndrome the presence of which may be considered a *sine qua non* for recommending electrical treatment. Rightly or wrongly, this is referred to here as endogenous depression.

It is desirable to be familiar with this syndrome for several reasons. Firstly, very good results can be obtained with treatment, provided that this is not too long delayed. Secondly, failure to recognize depression is the commonest mistake in psychological medicine. Thirdly, the syndrome about to be described is one of those most commonly encountered in psychiatric out-patients in peace time, though seldom correctly diagnosed by those who refer the cases. There are also several reasons for this failure both to diagnose depression and to recognize its frequency. First, the symptoms are themselves so simple and commonplace that their importance is easily overlooked. Second, many patients, since it is human to look for the cause, will attribute their symptoms to various other causes superficially plausible enough, but which will later be found an inadequate explanation; physical symptoms, both hypochondriacal and otherwise, are often used in this way. Other patients, again, unable to explain why they should be depressed in the absence of outside cause, may even refuse to admit to depression although it is there; unless specifically sought for, it may then be missed. Third, other symptoms of a more obvious and dramatic kind may divert attention from the basic and important ones. Thus, anxiety is often an integral part of an underlying depressive state and may overshadow the depression. Further, patients who are depressed, and specially those who cannot understand why, are often alarmed and disorganized by the basic depression, with the secondary development of anxiety or hysterical or hypochondriacal reactions as a consequence; such anxiety or hysterical or hypochondriacal features may then dominate the clinical picture. All these developments so often occur that it may be laid down as an axiom that wherever psychiatric symptoms develop in a person of previously reasonable personality and for no satisfactory outside cause, the possibility of an underlying depressive illness should always be suspected.

It is true that the diagnosis of depression can be very difficult, but if the following points are borne in mind, it can be rightly diagnosed in far more cases than not.

The essential symptoms can be considered, for

convenience, under two headings: (1) physical, (2) mental. The physical symptoms are firstly, a persistent lowering of the energy with consequent lowered drive and increased fatigability. There is thus a reduction of activity. This is almost always accompanied by loss of sexual appetite, and by a characteristic sleep disturbance which consists in frequent and early waking. Usually, but less invariably, there is loss of weight, and loss of appetite in a general sense. The mental symptoms run parallel. Thus, the reduction in physical activity is accompanied in the mental sphere by a feeling of being unable to cope as well as usual coupled with a disinclination to do as much as usual. These are commonly extended to become a loss of interest, confidence and decisiveness. With the loss of interest the patient can neither experience enjoyment nor 'get away from himself,' and so becomes to a greater or less extent self-absorbed. In fact, these resemble the symptoms of general debility, presenting as they do an appearance of reduced vitality and animation. The condition, however, is persistent and steady, showing little variation from one day to another, though most patients feel worse when unoccupied, and show a spontaneous rhythm, independent of outside events, of being worse in the morning and feeling less bad in the evening. (This rhythm is occasionally reversed.)

The diagnosis is arrived at by (1) exclusion of recognizable organic disease, (2) careful comparison of the patient's state when he is well with his state when he is seen. For a proper evaluation of this, it may be necessary (and is always desirable) to interview the relatives or friends. It will then be found that, though the patient may show some degree of response to congenial company and other pleasant diversions, this is temporary and incomplete, and that in general he never reaches his normal level of animation or enjoyment. The comparison between the patient's state when ill and when well is often rendered easier by the fact that very many of these patients are of good personality. The change from a normal state characterized by energy, interest, extraversion, enjoyment, confidence and decisiveness, to one characterized by relative anergia, loss of interest, self-absorption, joylessness, with lack of confidence and with indecisiveness, may then be very striking, providing that the comparison is sought. The keynote is *reduction*, as opposed to the expansiveness of the contrasting condition of hypomania.

We have said nothing so far of the mood itself and indeed this is relatively unimportant. In the milder cases, depression of mood may not be complained of at all, though it is always there to some extent. The patient is depressed in

general sense, and the depression of mood may be neither obvious nor important.

These mild cases are easily missed. It is partly for this reason that in out-patient departments they are very seldom seen in a first attack.

The diagnosis is more difficult in those patients who have long shown neurotic symptoms in the form of marked fluctuations in energy and interest, have been given to moodiness, tendencies to being 'fed up,' insomnia, and general instability of purpose and well-being. It is sometimes hard to tell whether such cases are showing one of their habitual over-reactions or whether they have also developed endogenous depression. The more that the symptoms vary from one moment to another, the more that the patient 'snaps out of it' when the telephone rings or there is talk of going to a party, the more likely it is that the condition is a personality reaction. On the other hand, the more that the symptoms are persistent and steady, occurring in a discrete attack that marks it off from the patient's normal state, the more probable does the diagnosis of endogenous depression become. In cases where enquiry elicits the essential depressive syndrome described above, the examiner should not necessarily be dissuaded from the diagnosis because the patient is showing anxiety or hysterical features. These may arise secondarily to the basic illness, as has been explained; and where they are foreign to the patient's previous personality and occur without other apparent cause, they are evidence in favour of endogenous depression rather than otherwise.

In more severe cases, the diagnosis may be plain enough. The reduction in activity may become very marked, leading to that generalized slowness called *retardation*. The indecisiveness may amount to gross vacillation. This, coupled with the retardation, may result in *perplexity*. Depression may be the presenting symptom in the less mild case, and the patient may show a diffuse pessimism with hopelessness of recovery and suicidal pre-occupation. By this stage the loss of interest may have increased so that the patient cannot experience normal emotion, is untouched by events of emotional significance (except perhaps by those that are sad or distressing), and cannot feel, for example, a proper affection for others (*affective loss*). Self-absorption may become extreme. Even the mildly depressed patient tends to be self-depreciatory; the markedly depressed patient almost always is. The self-absorption then encourages a brooding self-criticism with self-blame and pre-occupation with past failures, real or imaginary, leading to the familiar 'If only I had acted differently,' and 'If only I'd had more will-power.' The patient supposes others to share his own feelings about

himself, and may then feel unwanted and shunned. In this setting *ideas of reference* easily develop and lead to feelings of being critically spoken of, and of being able to discern disapproval or contempt in the innocent actions of others. These may be exaggerated into actual *delusions* of unworthiness or guilt, for which justification is often sought in minor misdemeanours that may have been committed in the past. Whenever feelings of guilt are expressed in the absence of powerful cause, depression should be suspected. Delusions of impending punishment are a not unnatural consequence of guilt-feelings. Other common ones are those of impoverishment or ruin. Patients may thus refuse to eat not only through anorexia, but because they feel unworthy, or that they cannot afford the food, or because they believe that it is being poisoned since they deserve to die. In general, these states will be coloured by the previous personality. Touchy and over-sensitive patients may become paranoid; easily agitable patients will become agitated, and this may mask the reduction of physical and mental activity; obsessional traits are likely to be exaggerated. This makes it the more important to attend to the basic symptoms.

There remains another type of depressive illness that is often misdiagnosed in the early stages, namely, *involutional melancholia*. This term is reserved for depressive states occurring for the first time in the involutional period of life, and that are stamped by two special features, (1) agitation, and (2) hypochondriacal trends, often of a bizarre kind. When seen in florid form, when the depression of mood is obvious, the diagnosis presents no difficulty. But it can be difficult in the early stages. This is because the condition is commonly ushered in by an insidiously developing hypochondriasis, often accompanied by numerous somatic symptoms usually mediated by the autonomic system, of which vague indigestion and abdominal pains are the commonest. These, and the persistent petulant querulousness with which they may be presented, distract attention from the underlying depressive symptoms which are usually regarded by the patient as secondary. It may be a year or more before the depression of mood becomes obvious to the examiner, unless he specifically enquires about it. It is quite common for the specialist to be confronted with involutional melancholic cases whose illness has been steadily in progress for two, three or four years, during which innumerable (usually unnecessary) physical investigations have been carried out, and much valuable time has been lost. In addition to the symptoms already described as liable to occur in the more severe depressive states, all of which may be present, the

established involuntional melancholic is especially likely to show agitation, guilt and hypochondriacal delusions. The longer the condition is allowed to go untreated, the more severe and irremovable are the symptoms likely to become; the patient may develop entrenched ideas that he is suffering from malignant disease, is unable to absorb food or is being 'rotted by syphilis.' The commonest of these beliefs is that the bowels are blocked, and if this has true delusional force it is almost diagnostic. In any other form of depression hallucinations must arouse suspicion as to the correctness of the diagnosis, but they do occur in involuntional melancholia. They may be olfactory, but auditory hallucinations are by far the commonest, in the form of voices that convey criticism, threats or tidings of woe. Not only should the occurrence of bizarre hypochondriasis with or without auditory hallucinations in a middle-aged or elderly patient prompt the idea of involuntional melancholia, but the occurrence of any marked hypochondriacal preoccupation in such a person who was not subject to it before, should do the same. Enquiry may then elicit the basic symptoms of endogenous depression underlying the more florid superstructure of hypochondriasis and agitation.

Patients with the conditions described above will respond well to electrical treatment, with few exceptions, provided that the illness has not been allowed to last too long. The indications do not depend, therefore, on obvious depression of the mood. Nor do they necessarily depend on suicidal preoccupations or threats, though these may incidentally be present. They depend, as far as depressive states are concerned, on the presence of a syndrome characterized by a persistent, diffuse state of reduced animation, with lowered energy, activity, interest and confidence, often with indecisiveness; with reduction of sexual (and often of general) appetite, with sleep characteristically disturbed by frequent and early waking, and often with loss of weight. There is no great variation from one day to another, though the patients tend to be worse when unoccupied, and there is commonly an autonomous rhythm (occasionally reversed) of being worse in the morning and less bad in the evening. This syndrome is experienced in attacks, with periods of normality in between. There is usually a history of one or more previous attacks, and there may be a history of previous hypomania. There is often a family history of the same thing. The attacks usually last in sustained fashion for weeks or months, but they may last for years. The clinical picture may vary with the severity of the attack, with the personality of the patient, and with the addition of anxiety, hysterical or involuntional

features. But underlying these, the syndrome as described is virtually constant, and will be found so on enquiry. Of special diagnostic importance are: (1) an otherwise inexplicable loss of efficiency in a previously effective person, (2) the occurrence of marked self-depreciation, loss of confidence or guilt in the absence of powerful cause, and (3) the onset of hypochondriacal pre-occupations in a person not subject to them before.

It remains to consider the selection of such cases for electrical treatment. In the writer's opinion the decision depends on (1) the severity and (2) the duration of the condition, and (3) whether there are signs of spontaneous improvement by the time the patient is seen.

In general, mild cases may be tided along without special intervention, particularly if the previous attacks have been short-lived. Previous attacks are the best, though an unreliable, guide to what may be expected in subsequent ones. But where even the mild attack becomes very prolonged, it may prove more difficult to treat the longer that it is allowed to last, for the prognosis with electrical treatment is less good in the second year than the first, and declines progressively thereafter. The prolongation of even a mild attack for more than a few months longer than is expected may, therefore, be an indication for intervening.

Where the illness constitutes any marked handicap to the patient's life, and particularly to his work, electrical treatment should not be withheld. This is, of course, particularly so if, in addition to the symptoms themselves, it is felt that there is any suicidal risk. Nor does there seem any point in waiting, provided that the diagnosis is reasonably assured.

The only exceptions would seem to be where obvious spontaneous improvement is already occurring. This is best judged by the intensity of the diurnal variation, the lengthening of the better periods which usually occur towards evening, the regaining of interest, the disappearance of self-absorption, and improvement of sleep with return of normal sex function. In these, the test is not so much in how the patient feels, as in what he is observed to do. It must be remembered, however, that the risk of suicide in endogenous depressions is greater in the phase of recovery, when the return of initiative and decisiveness may confer on the patient powers that were in abeyance when at his worst.

Finally, it should be borne in mind that, where local facilities are available, those milder cases that do not require admission to hospital can receive electrical treatment quite satisfactorily as out-patients, at the cost of only a few half-days off work. The number of treatments required

varies from four or five to seven or eight, though involuntal cases and those of long standing may need more.

A curious fact is that the treatment sometimes works later in the attack when it has failed to confer benefit before. This is usually so when the previous attack has been a lengthy one. Involuntal cases often show some tendency to relapse, and are liable to need more treatments on that account, while they tend in general to be more resistant.

Results:

In 257 depressive cases treated at St. George's Hospital as in-patients, 70 per cent. showed full recovery or something extremely close to it, while a further 26 per cent. were improved; and of 258 out-patients 66 per cent. recovered, while a further 26 per cent. were improved. This accords reasonably well with the results of other workers. (Cook (1944); Batt (1943); Fishbein (1949); Cohen (1951); Kino and Thorpe (1946); Fitzgerald (1943); Huston and Locher (1948).)

(2) *Confusional states.* That electrical treatment should be of use in treating confusion, while itself capable of causing it, is a paradox with important theoretical implications. Confusional states usually arise in connection with organic illness. The organic factors most commonly involved are (1) toxicity, whether from infection or from such exogenous substances as alcohol or bromides, (2) deficiencies of such various kinds as occur in pellagra, pernicious anaemia and endocrine disturbances, (3) exhaustion, and (4) epilepsy. The confusional states associated with such conditions range from simple clouding of consciousness through sub-delirious states to full delirium. The clinical picture is much the same whatever the underlying cause. Its cardinal features are disorientation, and impairment of grasp and memory. To these may be added heightened responsiveness to stimuli; this makes for psychomotor restlessness and encourages misinterpretations, owing to the impaired grasp. There may also be visual hallucinations, often of an alarming sort; auditory hallucinations may occur but are less common. The condition is essentially a fluctuating one. The patient may be attentive and responsive to questions at one moment, soon to sink back into a clouded state in which his attention cannot be gained. The hallucinations and misinterpretations (which amount to fleeting delusions) are likewise constantly shifting. The essence lies in the variability of the symptoms from one moment to another, so that though contact may be made, it is repeatedly lost.

The treatment of such conditions must naturally be directed towards their underlying causes.

Electrical treatment may none the less be useful in three different types of situation (Roth and Rosie (1953)). First, the patient's restlessness and the difficulty in imparting enough nourishment may lead to an alarming state of exhaustion, especially in the elderly and frail, in whom the development of clouded consciousness may itself be prognostically ominous. Should the condition deteriorate despite other measures, electrical treatment may be amply justified, and may even be a life-saving measure (Roth and Rosie (1953); Perry and Levy (1949); Pelletier and Paradis (1951)). Second, obscure confusional states are occasionally encountered that present an appearance of toxicity, although no amount of investigation discloses any aetiological agent (Roth and Rosie (1953); Delay and Maillard (1945); Eidem (1946); Perry and Levy (1949); Pelletier and Paradis (1951)). Where these do not clear readily, and where investigations suggest no other line, electrical treatment may again be justified. The same is true of persistent epileptic twilight states, which may be relieved by the onset of fits, whether spontaneous or therapeutically induced (Kalinsky and Kennedy (1943); Fernandes and Polonio (1946); Guiraud and Mallet (1948)). Third, it sometimes happens that confusional states persist even though the aetiological agents have been dealt with. This has been so in cases associated with pneumonia (Salm (1949)), with pernicious anaemia whose blood picture has been restored to normal (Fernandes and Polonio (1946); Ende, Klauber and Gendel (1950), Betts (1952)), cases with bromide delirium whose blood bromide has fallen to levels which could not account for its continuance (Roth and Rosie (1953)), cases of vitamin deficiency in which the deficiency has already been met (Fernandes and Polonio (1946)). In such as these, again, electrical treatment may be justified. The treatments may require to be given at first on successive days; the number may vary from three or four to seven or eight. The results are often dramatic.

Contra-indications

Apart from the principle that the treatment should not be given where there is nothing to suggest that it will do any good, contra-indications are few.

(1) *Physical contra-indications.* Fears used to be entertained for patients with hypertension, old coronary thromboses, healed or active tuberculosis, peptic ulceration, malignant disease, advanced Parkinsonism, disseminated sclerosis, etc. But patients with all these conditions have been treated without untoward effect. The writer has even been encouraged by eminent neurologists into prescribing the treatment for depressed

patients with cerebral tumours. With the introduction of relaxants the margin of safety has increased. Even women in advanced states of pregnancy are successfully treated (Simon (1948); Block (1948); Doan and Huston (1948); Da Silva and Alexandre (1950)). Yet, wisdom may dictate some hesitation in cases with serious physical disease whose psychiatric condition is such that an expectant policy can be justified, and, in general, the use of relaxants is indicated for patients with any serious physical disease, fragile bones, or with healed tuberculosis. Perhaps the only positive physical contra-indications, where relaxants are to be used, are recent coronary thrombosis, or the actual presence of heart failure.

(2) *Mental contra-indications.* There are only two groups of patients in whom the treatment is contra-indicated on psychological grounds. The first are hysterical patients who do not also have true depression. Where there happens also to be true accompanying depression, most hysterical patients will be sufficiently glad of the benefit conferred to show little or no exacerbation of the hysterical trends. But where the depression is itself hysterically determined and is a personality reaction rather than an illness (in which event it is likely to show great variability of all the individual symptoms, as compared with an endogenous depression), the patient's hysterical trends are likely to be increased by electrical treatment. No permanent harm is really done, but the situation gives the patient opportunity to develop new symptoms, all attributed to the treatment, and histrionic and demonstrative behaviour may be temporarily provoked, while the occasion may be made a lasting source of grievance. The other group of patients who may be adversely affected are tense obsessionals, also without true depression. Here, again, no permanent harm is done, but the tension and obsessionism may be temporarily increased following the treatment. Not all observers are in agreement upon this point, however, and some authorities would consider this an unnecessary note of warning. Certainly the treatment is not contra-indicated in obsessional states accompanied by endogenous depression; on the contrary, in these it is likely to benefit both aspects of the illness.

Three further points may be mentioned as dictating caution in giving the treatment on an out-patient basis. These are (1) when the illness is complicated by serious physical factors; this needs no comment, (2) when the patient lives alone, and (3) where the illness shows any anomalous features suggestive of a latent schizophrenia. All cases treated in an out-patient department should have an escort to see them home, but on arrival there a patient who tends to anxiety or

hysterical reactions may develop them on having to fend for himself in an empty house, unless he feels fully recovered from the 'muzziness' and slight uncertainty that is sometimes experienced after treatment. Again, patients who are not fully accessible, who appear suspicious or withdrawn, or who express ideas that are not immediately comprehensible as being in harmony with the depressed mood, are better not treated as out-patients. In such cases the treatment may release schizophrenic manifestations that the relatives may find alarming or difficult to manage in the home.

Complications

It is true that deaths have been reported in association with this treatment, from myocardial degeneration (Napier (1944), Scheidegger (1950)); coronary thrombosis (Sisler and Wilt (1953), Eyman and Morris (1950), Ebaugh (1943), Jetter (1944)); intra-cranial and other haemorrhages (Napier (1944), Riese and Fultz (1949), Liban (1951), Allen (1951), Cucchi (1951), Raskin and Johnson (1951), Sprague and Taylor (1948), Schulte and Dreyer (1950), Marchand and Masson (1947), Riese (1948), Will (1948)); pulmonary and fat embolus (Rogg (1953), Meyer and Teare (1945)); uraemia (Clute and Fitzgerald (1948)); hyperthermia (Nielsen (1950)), etc. But such events are exceedingly rare. By 1944 there had been only six recorded deaths in this country. By the end of 1953, the writer was able to find only about a further 50 recorded in the English and foreign literature. Kolb and Vogel (1942) estimated the death rate at 0.5 per 1,000 cases treated; further experience suggests that it may be less. When it is realized that the treatment is given to very large numbers of people who are elderly and in precarious health (Ehrhardt (1948); Kleinschmidt (1949)), and that the total number of applications must by now have run into millions, the smallness of the risk may be appreciated.

Minor vascular accidents and transient hemiplegia (Kaldeck (1948); Poloni (1949)) have very occasionally been reported. Transient cardiac arrhythmias occur (Altschule (1950); Craddock and Gilbert (1948); Kauntze and Parsons-Smith (1948)), but seem to have persisted in only one recorded case (O'Flanagan and Taylor (1950)).

In a series of 200 cases investigated at St. George's Hospital with electrocardiographic tracings taken before, during and after treatment, no complications of significance were found (Woods (1954)).

Pulmonary abscesses have occurred, though rarely (Gulperin (1949); Conway and Osmond (1948)); the estimates by Penta (1949) and Crosa and Viviano (1951) of their occurrence in 1.2 per

cent. of cases seems astonishingly high. That they occur at all is an indication for attending to loose or heavily-filled teeth. Active pulmonary tuberculosis seems to be little, if at all, affected (Pennachi (1949); Rivolta (1949); Will and Duval (1947); Jentoft (1949)), though it would seem that healed tuberculosis may sometimes be reactivated.

There have been occasional reports of spontaneous fits occurring after treatment in people not subject to them before (Fattovich (1944) (1948); Phillip (1952)). This seems more likely to happen in chronic schizophrenics than in any other type of case, and to depend on the existence of a constitutional predisposition (Vitello (1949); Delgado (1951)).

The only physical complications met with any appreciable frequency are dislocations and fractures. The former most often occur in the jaw and are easily reduced. The only fractures at all frequently encountered are crush fractures of the vertebrae, which as a rule occur only in strongly muscular patients. They may give rise to transient pains in the back, but otherwise seem to cause no trouble, even in patients who have been followed up for years, and they call for no special treatment. Their occurrence has been as high as 23 per cent. (Lingley and Robbins (1947); Funkhouser and Davis (1952)); but other assessments have been lower. In any event, neither fractures nor dislocations need ever arise if the treatment is given with relaxants.

If this list of possible complications should seem alarming, it must be re-emphasized that their rarity is the reason why they are reported; that their incidence is exiguously small compared with the number of treatments uneventfully given; and that the distress to which they give rise is in most cases slight compared with that occasioned by the illness.

Of the mental complications, only three are of consequence. First, transient disturbances of memory and concentration are common after the treatment. The patient, though warned that they may occur, should be re-assured that they will be short-lived. They tend to be more marked in elderly and arterio-sclerotic patients, and when the treatments are given often and at short intervals. Second, in manic-depressive patients it may sometimes happen that the treatment turns a depressive phase into a hypomanic one. Careful observation may go far to prevent this if further treatment is withheld as soon as the first warning signs appear. Third, as has already been mentioned, schizophrenic manifestations may occasionally be released in those depressive cases that show anomalous features.

In conclusion, it should be stated that electrical

treatment is not necessarily curative. It is likely to cut short the attack, but it is unlikely to alter the rhythm of regularly recurrent cases. Further, the treatment of the syndromes described is no routine matter of pressing an electric switch; electrical treatment is no more than an adjuvant, and is no substitute for the psychological treatment that will also be called for.

SUMMARY

1. The development of electrical treatment has been described.
2. The main indications for its use are in certain states of excitement, of depression, and of confusion. The nature of these has been described.
3. The few contra-indications have been mentioned.
4. The complications have been given in some detail because interesting for their rarity, but their rarity is emphasized.
5. The treatment is not necessarily curative, and is no substitute for the general psychological management. Its usefulness, however, is indisputable.

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THE MANAGEMENT OF PORTAL HYPERTENSION

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The normal portal venous blood pressure is higher than the pressure in a somatic vein of similar size because the portal blood has to traverse the sinusoids of the liver before it reaches the systemic circulation. The range of normal portal pressure is 6-12 cm. of saline. If a further obstruction to portal flow is gradually interposed, there will ensue a rise in portal venous pressure, sometimes to 30-40 cm. of saline and the development of collateral channels for the return of the portal blood to the general circulation. Such obstructions may occur inside or outside the liver. Extra-hepatic obstruction constitutes between 10 and 15 per cent. of all cases of portal hypertension and is encountered much more frequently in the portal than in the splenic vein. The commoner causative lesions are summarized in Table I. Intra-hepatic obstruction is almost invariably due to cirrhosis of the liver. Cirrhosis means a condition of the liver in which death of parenchymal cells has been followed by collapse of the reticular framework of the 'lobules', increased fibrous tissue formation and irregular regeneration of

surviving cells. The result is a gross distortion of the architecture and of the vascular pattern of the liver, greatly increasing the resistance to portal blood flow through it. Such a condition of the liver may be found if recovery occurs after a single massive injury such as severe infective or toxic hepatitis, or may develop over a period of years as a result of repeated chemical or metabolic trauma to the liver. Hepato-lienal fibrosis is the name given to a chronic condition in which both the liver and spleen are involved. Its aetiology is unknown. It occurs at an earlier age than cirrhosis, not infrequently in childhood. The splenic and hepatic changes are essentially similar to those

TABLE I

Portal Vein—	Congenital Obliteration	
	Angioma	
	Thrombotic Occlusion	
Splenic Vein—	Invasion	
	Occlusion	
	Occlusion by Thrombus	
	Occlusion by External Pressure	
	By Tumour Tissue	
	Scar Tissue	
	Pancreatitis	