SOMATIC PROCEDURES FOR THE RELIEF OF ANXIETY

A Review

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There is a close biological relationship between anxiety and tension. In a number of definitions, e. g., those given by Bleuler,[1] Masserman,[2] Noyes,[3] it is recognized that anxiety is a state of tension. To quote the definition by Noyes in the recent edition of his text: "Anxiety is a condition of heightened tension accompanied by a vague, but often most disquieting feeling of harm or disaster."

If we assume with Cameron[4] that tension is a state of psychobiological preparedness, then it is always with us, while anxiety is not. However, as tension increases in an organism, an affective element seems to emerge into consciousness which we experience first as anxiety and ultimately as panic. The anxiety which was apparently to supply its adaptive purpose to prepare us for the fight-flight reaction may become our Frankenstein instead of our savior.

Our concept of the neurophysiologic basis for these reactions rests on the experiments of Cannon[5] who advanced the theory that emotions were caused by thalamic-cortical interaction. Hormonal, visceral or motor accompaniments might be present but are not necessary.

Since we consider the expression of emotion, specifically anxiety, as being mediated through the same sympathetic, hormonal and motor mechanisms that mediate tension, we shall review the various therapies used to control anxiety as well as tension.

D. E. Cameron[7, 8] in a series of reports has described his experiences with the use of *adrenalin* administered intravenously frequently over a period of many months, for the treatment of three selected groups of anxiety states. He states that psychotherapeutic procedures are almost exclusively directed toward dealing with the primary causes of anxiety. These are ineffective, he holds, because the anxiety state has become autonomous; so he attempts to break up this autonomous reaction by decreasing the reactivity of the individual, that is by desensitization to adrenalin. These three groups can be briefly described as: (a) cases in which a severe catastrophic experience results in an anxiety state which shows no

tendency to clear up with the passage of time: (b) cases in which the anxiety symptoms appear as the consequences of long-continued exposure in difficult and trying situations, e. g., battle experiences in which the anxiety symptoms do not subside on removal from danger; (c) cases in which the individual has had to work at high tension for prolonged periods but in which there is no apparent conflict present. This group of cases would include housewives or civilians working under strain in industries.

Cameron pointed out that increased reactivity to adrenalin has been shown by Maranon, Bashova, Richter and Thorley to exist in patients suffering from anxiety states. Goodman and Gilman reported that tolerance to adrenalin, at least to its anti-spasmodic effects, may be established in asthmatics. In man, the prolonged intravenous administration of adrenalin also resulted in a drop in blood pressure below the initial level.

Cameron gives doses of 0.1 mg. of adrenalin sulf. in 1 cc. of distilled water intravenously at least three times a week. These doses are increased in frequency or quantity of adrenalin up to 0.9 mg. dependent on the patient's subjective and objective responses to the treatment. Over 40 patients have been observed for prolonged periods and, apparently, varying degrees of improvement have been obtained.

Cameron concludes from his work that "adrenalin desensitization" appears to be most successful where the anxiety state is autonomous and where anxiety has not become organized into fixed obsessive symptoms. He finds that desensitization by adrenalin is accomplished by reduced reactivity of the tissue structures to adrenalin, e. g., the cardio-respiratory systems, and an increased reactivity of the parasympathetic structures, e. g., the vagus nerve. It seems of great interest that a physiologic method has been used to treat these cases of autonomous anxiety, and that this appears to have been successful in a certain number of cases; however, it must be pointed out that this does not in any way imply that the initial disturbance was not psychogenic in etiology. Except for a very few instances, occurring primarily in the investigative field where anxiety can be produced by physiologic agents, one may say that anxiety is essentially an accompaniment of the reaction of the individual to his environment.

T. A. C. Rennie[9, 10] is only one of a number of therapists who have recommended the use of *insulin* in subcoma doses for the

treatment of anxiety in psychotic states and for some neurotic patients. He states: "Insulin in subcoma doses produces an effective method of sedation. Its specific action seems to be in the alleviation of anxiety. With the relief of anxiety the psychotic manifestations sometimes rapidly disappear."

It would seem that this method is safe and far superior to that achieved by the usual methods of sedation. The dosage is dependent on the patient's sensitivity to insulin. The number of treatments administered is comparable to those in standard shock therapy, i. e., apparently up to 50 treatments. Rennie advocates that the treatment be combined with organized psychotherapy.

Besides the use of these two hormones, insulin and adrenalin, other substances found in the tissues such as *histamine*[11] and a mixture of *carbon dioxide and oxygen*[12] have been tried to produce effective changes. Reports to date on the use of these lack confirmation by other than the original workers, or there is insufficient follow-up observation.

Sargent and Slater,[13] in their book on physical methods of treatment in psychiatry, emphasize the importance of *alcohol* as the socially-approved drug which has psychiatric value. Various religious groups have used it for obtaining emotional release. Psychiatrists have been fortunate in finding a drug family, the *barbiturates,* which will consistently give relief from anxiety and lessening of tension. The drug can be given orally or parenterally. The dramatic effect when given intravenously has been emphasized in the techniques known as narcoanalysis and narcosynthesis. Dosages, as well as techniques, have been described in many papers.[14, 15]

The latest report on the action of *sodium amytal,* based on experimental studies, concludes that the depressive effect is predominately cortical and begins in the frontal lobes. It is only when the phase of sleep is reached that the "central regions" of the brain are depressed. "The primary psychic effect of sodium amytal seems to be a weakening of the emotional drive as demonstrated especially clearly in anxious depressions. The anxiety first subsides and the mood then becomes slightly euphoric. Pentothal sodium on the contrary does not adequately relieve the anxiety."[16]

A word must be said regarding continuous narcosis in which the barbiturates are often administered by rectum in combination with other somnifacients. It has been noted that it is chiefly of value

when patients are too anxious and unco-operative for more radical forms of treatment. When the anxiety has abated insulin sub-shock therapy may be started.

The problem of the acute psychiatric emergency in peace time, e. g., the girl who has suffered marked psychic trauma because of an attempted rape, has been highlighted by our war-time experiences. It would seem to be desirable therapy both for the immediate and the prophylactic effect to put the patient to sleep immediately and then attempt later to obtain abreaction and to prevent the development of many associations colored by anxiety.

There is a significant unanimity of opinion in opposition to the use of *electric shock* therapy in the patient with an anxious temperament.[17] Patients with anxiety hysteria seem to be the least amenable to electric shock therapy. Most of them remain unimproved. Some have felt temporarily relaxed and less tense. The conditions of others have been aggravated by fear of the treatment or by side-effects such as memory impairment and the feeling of unreality, which is resented much more by neurotics than by psychotics. Kalinowsky and Hoch believe that fewer treatments at longer intervals are preferable when the treatment is given only to relieve tension, or to make the patient more accessible to psychotherapy.

As to *psychosurgery,* a total of 5,000 cases of lobotomy was reported at the International Congress of Psychosurgery at Lisbon, Portugal in August 1948.[18] Results could not be tabulated statistically because of the lack of a common terminology and nomenclature. Lobotomy was reserved as a generic term for all psychosurgical operations. It was suggested that the terminology of the various subdivisions should be descriptive of the location and the structure sectioned and that the principal headings include: (1) cortical ablations; (2) cortical undercutting; (3) leucotomy; (4) thalamotomy; (5) lobectomy. However, it should be emphasized that thalamotomy is different from the operations on the cortex or the white matter of the frontal lobe, in that it spares the frontal association systems which are affected in all other procedures.

While the indications for these operations would seem to be increasing, the universal observation is that tension is particularly diminished.

There is no large group of cases of leucotomy reported in which the post-operative diminution of anxiety is reviewed statistically.

Possibly the closest approach is the group reported by the Board of Control (England and Wales).[19] In Table IX of this report, one notes that the symptom of agitation is analyzed for post-operative changes. If one assumes that this is usually the motor manifestation of marked anxiety, it may be noted that in every case there was post-operative improvement, with complete disappearance in 71 per cent of the cases. If one has symptoms that are not accompanied by the elements of self-concern, anxiety or tension, it would not seem advisable to perform an operation that has a number of undesirable complications. In the classical operation popularized by Freeman and Watts, the outstanding unwanted personality manifestation is described in these words of a patient's relative: "He has lost his soul." The patient no longer feels deeply about anything.

It may be asked if we are justified in attempting to remove anxiety in a severely neurotic patient with a procedure in which, as it has been said, the patient loses his soul.

The writers are in complete agreement with the following quotation from Report No. 6 of the Group for the Advancement of Psychiatry, entitled, "Research in Pre-frontal Lobotomy." "When we ask ourselves, why are we so interested in lobotomy and allied procedures and why is there so much emotional conflict about it, we must realize that it is more than an experimental procedure to determine the function of the deep white bands of fibers which course to and from the frontal lobes. It is an operation performed in the name of therapy, steadily advised with greater frequency not only for intractable psychoses but also for a wide variety of psychological disturbances. It is now being used for neuroses and in some clinics even for the treatment of war neuroses. It is often done hastily, without adequate previous study, without the previous use of rational therapeutic measures and it is performed before an opportunity is afforded for possibility of spontaneous remissions. It represents a mechanistic attitude toward psychiatry which is a throwback to our pre-psychodynamic days which in itself would not be of great concern if it were successful and did not harm the patient. It is a man-made self-destructive procedure that specifically destroys several human functions which have been slowly evolved and that especially separate us from other animals. If the operation is of importance as a therapeutic procedure in certain selected cases, it becomes all the more important for us

to establish definite clinical indications and controls so that its usefulness will not be diluted by utilization in situations where it can do little good and much harm."

The occurrence of an intellectual deficit, of undesirable personality changes and the possible onset of a convulsive state directly attributable to the trauma to the frontal cortex or to its connection with other cortical areas made Spiegel, Wycis and Freed seek for an improved procedure. This, the authors have named thalamotomy and described in detail in previous papers.[20, 21]

Let us consider the neurophysiology underlying the procedures of lobotomy and thalamotomy. Afferent sensory stimuli entering the thalamus (ventral nuclei) are transmitted to the sensory cortex, which is the basis of perception. Part of the afferent stimuli are relayed to other thalamic nuclei such as the dorso-medial nucleus. This nucleus, on the one hand, is able to transmit impulses to the prefrontal cortex (Brodmann's areas 9 to 12); on the other hand it may be influenced by efferent fibres from these areas. In this way a reverberating circuit is established which seems to be one of the main mechanisms responsible for emotional reactions.* This mechanism may be interrupted by prefrontal lobotomy, which, however, also interrupts the association systems connecting the frontal lobe with other cortical areas. It may also be interrupted by medial thalamotomy which tries to affect this system in as isolated a manner as possible.

In the series of thalamotomies observed by Spiegel, Wycis and Freed, there was a group of 12 cases in which anxiety was a prominent symptom. After thalamotomy, there was an immediate diminution of anxiety in every patient in this group. However, five of these patients relapsed within a matter of weeks post-operatively. Three were re-operated upon with improvement in each case which has continued to date. In one patient who was mark-

*Masserman (Ref. 2) believes the hypothalamus plays a role only as effector apparatus innervating the vegetative reactions to emotions. There are, however, some experiences indicating that hypothalamic stimuli may play a role in the genesis of the subjective experience of emotion, such as Foerster's experience (Ref. 22), during the operations for hypothalamic tumors, and Grinker's (Ref. 23) work stimulating the hypothalamus from the pharynx. Experiments by Spiegel and Miller (Ref. 24) have shown that lesions in the subthalamus, leaving the hypothalamus intact, may produce a certain degree of depression of psychomotor activity, somnolence and catalepsy. These experiments suggest that hypothalamic impulses directed upward toward the thalamus and the cortex may stimulate the activity of these centers and thus increase the activity of the diencephalic-cortical reverberating circuits.

edly catatonic and completely inactive there developed a transitory state in which the patient within a week after operation became rather aggressive, sexually and otherwise. Three weeks after the operation he was quiet, said he felt relieved of tension and said that the auditory hallucinations had stopped completely. A month later he was paroled. This transitional state of aggression may have more than passing psychopathological significance as will be brought out in the discussion. In one case the lessening of tension tended even to approach a state suggesting apathy. Thus far, none of the complications or undesirable by-effects of leucotomy such as facetiousness, childishness and lack of foresight has been observed in the writers' cases of thalamotomy. In none of our cases did epileptiform convulsions develop.

Discussion

The pre-eminence of anxiety as an affect that must be treated is accepted by psychiatrists today. It can be the most disturbing manifestation in various forms of mental illness. Psychotherapy has always been used initially for it, frequently in the form of simple reassurance combined with sedation. With the development of shock therapy more drastic procedures culminating in psychosurgery are now being used. However, it should be emphasized that recourse to such measures should be taken only if psychotherapy has failed.

Is there a psychopathological explanation for the disappearance, not only of tension, but also of delusions, seen in schizophrenics after thalamotomy? The hypothesis which Rennie has tentatively suggested for the relief of anxiety with insulin subshock therapy is worthy of consideration. He agrees with Bleuler[25] that affectivity dominates all other functions of the psyche and concludes that in disturbances in any sphere of the personality it is the disturbed affective mechanism that first creates manifest symptoms. The presence of a disturbing affect like anxiety with certain associations would produce delusions. If we lessen tension, thus diminishing anxiety, the pathological associations will fall away and so-called normal thinking will result. It has been recognized by Rosen[26] and many other observers that the acutely catatonic, completely withdrawn patient is an individual frozen with fear. This was well illustrated by the aforementioned catatonic, withdrawn patient who became sexually and otherwise aggressive, as well as

more responsive to the environment, after thalamotomy. Apparently thalamotomy helped this patient by diminishing the degree of anxiety present and thus allowed a free expression of repressed aggression and hostility.

Summary and Conclusions

1. There is a unanimity of opinion that psychotherapy is the treatment of first choice for anxiety associated with the psychoneuroses. It is only when this approach has failed or cannot be utilized that any of the somatic procedures may be indicated.

2. Insulin subshock therapy would seem to be definitely of benefit in allaying anxiety both in the neuroses and the psychoses.

3. The work of D. E. Cameron on autonomous anxiety and its treatment by adrenalin-desensitization is valuable from a theoretical aspect and promising from the therapeutic angle.

4. The use of the barbiturates to lessen tension and diminish anxiety has been amply reviewed and confirmed by many observers.

5. In contradistinction: Electric shock therapy seems to have limited value in anxiety states, and, indeed, in some cases it is claimed that anxiety has been enhanced because of a residual fear of treatment.

6. The now classical procedure of prefrontal lobotomy has unquestioned value in relieving anxiety-tension states but produces undesirable by-effects such as convulsions, diminution of intelligence, and "blunting of the personality" characterized by childishness, lack of foresight, impaired judgment and shallowness of feeling.

7. The latest procedure is thalamotomy which is aimed to obtain the beneficial results of lobotomy, i. e., relief of tension and anxiety without the aforementioned undesirable complications.

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