PSYCHIATRIC ASPECTS OF HYPERVENTILATION *

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The close association between respiratory activity and emotion has long been recognized. Shakespeare's reference to 'the lover sighing like a furnace' contrasts strikingly with Coleridge's picturesque description of 'calm thoughts' being as 'regular as infant's breath.' Widely divergent emotional states such as joy, alarm and grief may be accompanied by changes in the rate, rhythm and depth of respiration. The gasp of fear, the mournful sigh of melancholy, and the bellow of anger, are phrases in our language which bear witness to this well-known relationship.

Of particular interest to the clinician is the phenomenon of over-breathing, the physiological changes accompanying it, and the symptoms attributable to these changes. Voluntary hyperpnoea leads to a reduction in the CO_2 tension of the alveolar air and a rise in the O_2 tension. Plasma CO_2 content falls, the alkalinity of the blood increases and a compensatory excretion of a more alkaline urine with a lower ammonium content occurs. The urinary volume and phosphate content increase; acetonuria is present and the blood lactate rises. The pulse accelerates and may become irregular, and cutaneous vasoconstriction is observed. Leucocytosis and hyperglycaemia have been reported. The blood flow to the brain is decreased and local cerebral anoxia results. There is slowing of the electro-encephalogram and enhanced excitability of the motor cortex to electrical stimulation.[1]

Accompanying these physiological changes are a wide variety of physical symptoms referable to any system of the body. Neurological symptoms include lightheadedness, giddiness, faintness, blurring of vision, tinnitus and headache. Feelings of unreality, sleepiness, emotional lability with foolish laughing or crying and intense anxiety may be experienced. Movements become clumsy and consciousness may be lost. Peripheral paraesthesias of fingers, toes and tongue and lips occur and may spread to involve the whole body, and the classical manifestations of tetany with fascicular muscular twitching and carpopedal spasm may supervene. Circulatory symptoms include palpitations, precordial pain, and cold extremities. Profuse sweating, increased frequency of micturition, abdominal distension, flatulence and aerophagy have been described.

Not uncommonly in the practise of internal medicine and psychiatry, patients present with symptoms conforming wholly or in part to those outlined above. Sometimes these patients complain of respiratory difficulties such as sighing, the inability to get enough air in, or a smothering sensation over the chest, but more often they are unaware of the fact that they are over-breathing until leading questions direct their attention to their respirations. They complain instead of some or many of the numerous symptoms attributable to over-breathing. Characteristically symptoms occur episodically, but in some cases continuing as distinct from periodic symptoms dominate the clinical picture. This, the hyperventilation syndrome, commonly occurs in the absence of organic disease and is usually labelled functional or psychiatric. Typically, the patient's symptoms can be reproduced by instructing him to over-breathe.

The purpose of the present paper is to describe the psychiatric manifestations in a group of 25 patients in all of whom symptoms and signs attributable to hyperventilation formed a prominent part of the symptomatology. In many the presenting symptoms were those ascribed to hyperventilation, while in others psychiatric symptoms of various kinds were to the fore. In all, however, physical symptoms caused the patient considerable concern and could be reproduced by over-breathing. The present psychiatric findings will be compared with others in the literature and an attempt made to assess the status of the hyperventilation syndrome in psychiatry. The diagnosis in these 25 cases embraced a wide variety of psychiatric conditions, as follows:

Psychoneurosis		
Anxiety state	11	
Hysteria	2	
Mixed	2	
	—	15
Character Neurosis ..		3
Psychosis		
Depression	2	
Schizophrenia ..	4	
Paranoid state	1	
	—	7

Psychoneurosis

In the patients suffering from anxiety states, symptoms attributable to hyperventilation occured mainly episodically and formed an important part of the acute anxiety spell or panic state. During these attacks the anxiety was at times free floating, but more often specific phobias such as fear of dying, of collapsing, of the heart's stopping, of choking or suffocating, and of losing control and going berserk, coloured the patient's mental state. Not infrequently resentment and hostility accompanied the anxiety and attacks of panic were likely to occur in situations where aggressive impulses were aroused. In many patients depressive feelings were present.

Case 23. A 42-year-old married man, a skilled instrument maker, presented with spells of acute anxiety accompanied by a sensation of lightheadedness, pins-and-needles of fingers, intense palpitations and sweating, a choking sensation, and the conviction that his heart would stop and he would die. This patient had always been anxiety prone and behind a façade of spurious independence strong dependent needs were present. Whenever his security or that of his family was threatened, anxiety would supervene. He was markedly ambivalent towards his children and resented intensely the demands they made of him which he considered excessive. This attitude appeared to be related to his own feelings as a child, when he felt deprived both materially and emotionally. In situations when his hostility was aroused, he entertained sadistic fantasies towards his wife and children and simultaneously became intensely anxious and developed symptoms attributable to hyperventilation.

Case 1. A 35-year-old married woman, whose presenting conflict concerned her relationship with her husband, an unstable unreliable individual, presented with attacks of palpitation, dizziness and faintness, pins-and-needles of fingers and hands, precordial pain, and the fear that she was having a heart attack. These episodes occured particularly when she was alone waiting for her husband to return home late at night. She alternately hoped that he would return quickly, then angrily entertained ideas that he had been injured or killed on his way home. The occurrence

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of these death wishes in consciousness was associated with anxiety, and hyperpnoea and its physical accompaniments.

Apart from the role played by hyperventilation in the acute anxiety spell in some patients diagnosed as anxiety states, little overt anxiety was present in others at the time when physical symptoms were prominent. In these, symptoms could be regarded as examples of affect equivalents in which the specific physical symptoms of anxiety occurred without the patient being aware of their affective significance.

Case 8. A 33-year-old married man complained of precordial pain, palpitations, a smothering feeling over the chest, pins-and-needles of the fingers and a lightheaded sensation with fealings of unreality. He denied feeling anxious, although mild phobic symptoms had been present in the past, referring particularly to heights and to travelling in lifts. His symptoms commenced soon after his marriage and his assumption of the responsible role of husband and breadwinner. He was the baby of a large family indulged by his mother and resentful of having to give up this favoured position. His symptoms became accentuated during his wife's pregnancy and after the child was born. He could not bear to hear the infant screaming, and at times would walk out of the house to get away from the cause of his irritation. In situations like these, although denying anxiety he would complain of the concomitant physical symptoms.

In 2 patients hysterical mechanisms were prominent. In these, attention-seeking motives were clearly expressed through their symptoms, and in both a past history of varied somatic pains and repeated operations was obtained. They described their symptoms in an histrionic manner and yet displayed no overt anxiety, which clearly had been converted into physical symptoms.

In 2 patients whose diagnosis is, psychoneurosis mixed, both anxiety and hysterical mechanisms were present.

Character Neurosis

In 3 patients features in their histories indicated their marked tendency to react psychopathically under stress. Difficulty in making stable interpersonal relationships, impulsive aggressive behaviour, recurring maladjustment in work situations, and failure to profit from experience, were typical of these patients. When behavioural and character disturbances of this nature are the predominant findings in a patient a diagnosis of psychopathic personality is indicated.

Case 3. A 34-year-old married man who complained of symptoms compatible with the hyperventilation syndrome, revealed in his history that his main difficulties were related to a severe character disorder. He had frequently changed jobs as he was unduly sensitive to criticism and at times distinctly paranoid. On occasion he would become actively hostile and aggressive; he would make impulsive decisions adversely affecting his family's security with little thought of the consequences. Time and again he would become involved in debt and soon after being helped out by a more affluent member of his family would repeat the same apparently purposeless behaviour and create new problems for himself.

Psychosis

In the psychotic group of patients, both depressive and schizophrenic illnesses were encountered. Again anxiety was the usual affective state, accompanying symptoms of hyperventilation, but in these patients the anxiety was of a psychotic nature.

Case 20. A 56-year-old married woman, always a timid reserved personality, had for some 3 months complained of increasingly severe and frequent attacks of palpitations, a heavy feeling in the chest, dizziness and lightheadedness, pins-and-needles and numbness of fingers and tongue, and bouts of loud belching. Apart from these periodic symptoms she became increasingly tired, listless and anorexic, and symptoms indicative of an endogenous depressive illness supervened. She would awake early in the morning and failing to get back to sleep would become more and more agitated. Depressive feelings were at their worst early in the day, lifting somewhat as the day wore on. Formerly interested in a variety of activities, she lost her zest for living and became convinced that she would never get well and that her end was near. Her preoccupation with her physical symptoms assumed near-delusional proportions and it was only after she had been treated by electroconvulsive therapy that the depression and the physical symptoms were relieved.

Among the 4 patients with schizophrenic illnesses, symptoms of hyperventilation were misinterpreted in a delusional way and bizarre explanations of their symptoms were offered.

Case 6. A 22-year-old commercial artist had for years been convinced that he had heart disease. Repeated reassurances from various doctors had failed to persuade him that he was wrong. From time to time he would experience feelings of unreality, giddiness, the fear that he was going to die, palpitations, sweating, and paraesthesias of his fingers and arms. These attacks he said were proof of his inferiority both physically and mentally. He was reticent and suspicious and expressed himself in a stiff disjointed manner. Ideas of reference were elicited and he complained of auditory hallucinations, the content of which included remarks about his gross mental and physical deficiency and derogatory whispers that he was homosexual.

Case 11. A 45-year-old widow had all her life been considered queer, sensitive, suspicious and quick to take offence. Since the death of her husband 5 years previously she had become prone to feelings of depression and preoccupied with physical symptoms. She felt unreal, as though in a dream, and at times a film would come down in her head. A constricting feeling around her chest prevented her from breathing properly and her hands and feet felt prickly and numb. She ascribed these symptoms to the fact that she was being hypnotized by her Native servants and was in constant fear that her home was about to be broken into and she and her children attacked. She misinterpreted actions and words of those about her and was paranoid in the extreme.

DISCUSSION

It is clear from the findings described above that a wide variety of psychiatric disorders is encountered among patients suffering from the hyperventilation syndrome. Reference to the literature suggests that the cases are loosely bound together as psychoneurotic or functionally disordered. Thus Kerr *et al.*[2] state 'this symptom complex while not seen exclusively among persons suffering from psychoneurosis is frequently found in them and its manifestations designated as anxiety states. Typically all the patients give a story of an encounter with some difficulty which causes emotional stress and anxiety.' Carryer *et al.*[3] observe that the syndrome occurs in tense, excessively anxious depressed or psychoneurotic patients. Gliebe,[4] while emphasizing the frequency with which hyperventilation may simulate organic disease, observes that hyperventilation occurs as part of a fear reaction in emotionally unstable people. Confronted by a situation in which he is inadequate the patient may transfer his anxiety to any organ by a sequence of physiologic changes consequent on hyperventilation. The importance of hyperventilation as a trigger mechanism in the precipitation of manifestations of hysteria is emphasized and the probability that hyperventilation contributes to the acute anxiety attack is mentioned. Edwards[5] describing a group of 63 patients says that all except 2 were considered to be individuals unusually sensitive to the tensions and conflicts of life and reacted to these conflicts with unjustified apprehension. In the majority of these patients the anxiety was free floating and chronic with more recent transference to fear of heart disease. Of the 2 exceptions, one suffered from a chronic personality disorder and the other had infective hepatitis. None of the patients were

psychotic. Lewis[6] points out that psychic features of varying nature and degree are the rule but may be masked. Anxiety, tension and apprehension are usually evident but in some hysterical subjects they may be concealed behind an inappropriate façade of apparent calmness. Engel[7] maintains that the hyperventilation syndrome may occur as a more or less non-specific reaction to the experience of terror, extreme anger, severe pain or other intense emotions, or it may be a symptom of neurosis. In anxiety attacks it represents the physical concomitants of the anxiety. A sensation of smothering or suffocation is common during anxiety and may produce over-breathing of which the patient is unaware. In other instances hyperventilation represents an hysterical conversion symptom effecting the relief of tension in a more symbolic way. In such instances it may represent the expression of a repressed wish for sexual intercourse or repressed hostility. Both mechanisms may be seen in the same patient. Dibden[8] considers the hyperventilation syndrome to be an expression of personality inadequacy. 'It occurs most often in patients with anxiety hysteria, in obsessive aggressive personalities.' Rome[9] states that patients with dyspnoea of psychological origin are often anxiety hysterics but that a large group consist of those patients whose symptomatic response to stress preferentially assumes this mode of expression.

The present findings and those culled from the literature suggest that commonly hyperventilation is associated with anxiety of varying intensity and kind. The affective state of anxiety and its physiological concomitants is met with in diverse psychiatric conditions. In anxiety states it is of course an outstanding symptom; but anxiety may be an important manifestation of schizophrenic and depressive illnesses too. In all these conditions symptoms attributable to hyperventilation may occur. In some anxiety states these symptoms contribute to the panic spell while in others they are affect equivalents in which the physiological concomitants of anxiety occur without the patient's being aware of their affective significance. In hysterical patients the symptoms express the patient's conflict in a more symbolic way and overt anxiety is not apparent. In depression and schizophrenia the anxiety is of a psychotic kind and symptoms of hyperventilation may be misinterpreted in a delusional way.

These considerations have important implications in the treatment of patients with this symptom complex. Some workers suggest that once the patient has been made aware of the nature and mechanism of symptom formation, and then reassured, lasting benefit will accrue. This approach no doubt is justifiable in individuals whose symptoms are of acute onset and related to a severe stress situation, and who have displayed few tendencies to react psychoneurotically in the past. It is well recognized that an anxiety state may vary from an acute self-limiting disorder to a chronic disabling condition requiring prolonged treatment. In the latter case symptoms will certainly not respond to simple reassurance and explanation. Similarly in patients with character disorders only intensive psychotherapy is likely to help, and even then benefit is uncertain. Similar considerations apply to patients with depressive or schizophrenic illnesses whose disorder must of course be treated appropriately.

Hyperventilation then is one aspect of the individual's anxiety reaction, and the mechanism whereby certain physical symptoms are produced in patients suffering from various psychiatric disorders. The diagnosis hyperventilation syndrome is an incomplete one, for a proper psychiatric diagnosis is always available and it is on this diagnosis that the efficient handling of these patients depends.

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