Acute Settings and Conditions: Intensive Care Unit, Heart Disease, Stroke, Seizures

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26.1 Vignettes

1. A 24-year-old woman with subarachnoid hemorrhage due to rupture of a berry aneurysm was admitted to the intensive care unit (ICU). A psychiatric consultation was requested as the patient seemed to be depressed. The consultant found that the patient felt sad about not being able to see her 2-year-old son, as children were not allowed in the ICU. She was afraid that she might die without being able to say goodbye to him. The consultant was able to obtain special permission from the administration for her husband to bring the child once a day. She recovered fully from her hemorrhage.
2. A 17-year-old girl was admitted to the ICU after ingestion of 50 acetaminophen tablets in a suicide attempt. The patient's liver enzymes were elevated, and she was being treated with acetylcysteine. A psychiatric consultation was requested for the suicide attempt. The consultant found that the patient had symptoms of increasing depression over the past 3 months, with serious suicidal plans and termination behavior, such as giving her iPad to her closest friend and writing a goodbye letter to her parents and boyfriend. She was sorry that she did not die, and saw no point in continuing to live. The consultant decided to transfer her to a psychiatric inpatient facility when her medical condition stabilized. The consultant ruled out the use of

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an antidepressant at present because of the patient's compromised liver condition, but antidepressant therapy would be started upon transfer to a psychiatric hospital.

26.2 Delirium and Psychosis in the Intensive Care Unit

Acute illness is usually accompanied by acute stress. Altered states of consciousness, particularly delirium, are common in patients with acute illness, especially in the intensive care settings. Acute stress often induces dissociation in predisposed individuals, and medications used to treat the medical symptoms, such as narcotic pain medications and steroids, can contribute to confusion and delirium. The confusing sensory overload and deprivation common in ICU settings where night and day may be indistinguishable also contribute to delirium. Delirium with psychotic features such as visual hallucinations, paranoid delusions, and agitation has been called "ICU psychosis" (McKegney 1966; Eisendrath 1980).

Facilitating acute medical treatment is the primary goal of psychiatric intervention in the acutely medically ill patient. While treatment of delirium, particularly with psychotic symptoms, is desirable, the patient may be in need of the medications that may be responsible for the delirium/psychosis, such as steroids, for maintaining life. Under such acute conditions, the consultant may recommend further sedation, even to the point of keeping the patient asleep during the acute phase of treatment, or antipsychotic drugs to control the psychotic symptoms while continuing the medical drug. On the other hand, medications that require time to work, such as antidepressants, and drugs that may further complicate medical conditions, such as liver function or cardiac function (e.g., thioridazine, ziprasidone, citalopram, that may prolong the QT_c interval), may be best withheld during the intensive care stay. With ICU psychosis, transfer out of the ICU is indicated as soon as feasible. See Chap. 12 for further discussion on delirium.

26.3 Stress, and the Role of Psychological Defense Mechanisms, Coping Styles, and Personality

Acute medical illness, especially severe enough to require ICU admission, is a stressful event. In addition to the acute symptoms that may be painful and frightening, patients have the added stress of uncertainty about whether or not they will survive or be disabled and about how long they will be hospitalized, as well as concerns about family, job, pets, and so on. There should be routine inquiry about the particular concerns each patient has regarding acute hospitalization. In an acute setting, certain accommodations to alleviate the patient's stress may be necessary, such as allowing a child to visit (as in Vignette 1). The medical staff should always maintain a channel of communication with the patient and family, and discuss any new developments in the diagnostic process and treatment plan and allow them to ask questions. An important aspect of stress management is information and strategic planning that brings a sense of mastery to an uncertain situation.

The physical setting of the ICU may have a unique meaning to the patient that can only be understood by communicating with the patient (as in Vignette 1 in Chap. 14). A common reason for ICU psychiatric consultation is a serious suicide attempt, which may be the result of a serious untreated depressive syndrome (as in Vignette 2). Even when a severe depressive syndrome is present, the consultant should exercise caution in considering the use of antidepressants as the patient's metabolic function may be altered (e.g., liver damage with acetaminophen overdose). It is generally judicious to wait until the patient is transferred out of the acute ICU before starting antidepressant drugs.

The acute stress associated with an acute medical illness naturally recruits the patient's psychological resources, which include defense mechanisms, coping mechanisms, and an exaggeration of the personality traits. Psychological defense mechanisms, such as denial and

repression, refer to unconscious, automatic mechanisms the individual uses in the face of anxiety-provoking situations. Coping mechanisms refer to conscious, deliberate ways of dealing with stress, such as getting information about the disease or procedure, or seeking diversion, such as relaxation techniques. Personality style (see Chap. 25) is usually exaggerated in the face of stress.

Denial as a defense mechanism has been shown to be adaptive during the acute phase of myocardial infarction in the CCU (Hackett et al. 1968), but maladaptive in seeking help and during the recovery phase (Levine et al. 1987). During the recovery phase, patients who use denial tend not to undertake the lifestyle modifications necessary to prevent recurrence of the disease. Intellectualization in the form of reading about the disease and discussing it with the health care professionals can be an effective way of reducing anxiety and gaining a sense of mastery.

In general, patients' defense mechanisms should not be challenged during the acute phase of an illness, but rather respected. Frontal challenge of a defense mechanism is likely to result in an uncontrolled anxiety or a rupture in the relationship between the patient and the health care professional. Coping mechanisms should be respected and enhanced, including teaching new coping mechanisms such as relaxation training.

As stress accentuates personality traits, someone who tends to be usually vigilant may appear to be paranoid, someone who is exacting may seem to be obsessive-compulsive, and someone who tends to be expressive may come across as being histrionic. The health care professional should recognize the role of stress in exaggerating such personality traits, and not rush in labeling the patient as having a personality disorder. With relief of the stress and anxiety, their personality will return to baseline.

26.4 Heart Disease

26.4.1 Anxiety

There is a close reciprocal relationship between heart disease and both anxiety and depression. The Normative Aging Study, a longitudinal prospective study of older men in Boston, found a significant association between baseline increased anxiety and sudden cardiac death at follow-up, and a dose-dependent relationship between the degree of depression at baseline and coronary artery disease at follow-up (Kawachi et al.. 1994; Sesso et al. 1998).

About 50 % of patients with an acute coronary syndrome exhibit symptoms of anxiety and about 25 % experience as much anxiety as an average inpatient in a psychiatric unit. Patients with increased anxiety in the hospital usually continue to experience anxiety at least 1-year posthospitalization (Cassem and Hackett 1971; Billing et al. 1980; Crowe et al. 1996).

Panic disorder is particularly associated with cardiac symptoms. Approximately 20 % of patients who come to the emergency room with chest pain meet the criteria for panic disorder and patients with coronary artery disease are four times as likely to have panic disorder as the general population (Huffman et al. 2002; Huffman and Pollack 2003).

26.4.1.1 Treatment of Anxiety in Cardiac Patients

Patients who suffer an acute coronary event often feel anxious because they feel out of control. They often feel reassured by the calm and competent demeanor of the health care professionals who show an interest in the welfare of the patients. Frequent visits by the physicians and nursing staff and inquiring about patients' needs can be highly anxiolytic. Discussion of such behavioral preventive measures as exercise, diet, and smoking cessation provides a sense of control over the illness. Teaching relaxation techniques can also be helpful.

Benzodiazepines are useful in treating acute anxiety. Lorazepam 0.5–1 mg po every 6 h PRN is commonly used. Scheduled doses of longer acting benzodiazepines, such as clonazepam 0.5 mg twice a day may prevent unnecessary anxiety.

SSRIs may be used to treat anxiety and depression in cardiac patients (see Sect. 26.4.3 below).

26.4.2 Posttraumatic Stress Disorder

Posttraumatic Stress Disorder develops in about 8–16 % of patients following a myocardial

infarction or coronary artery bypass graft (CABG) (Doerfler et al. 1994, 2005; Stoll et al. 2000; Shemesh et al. 2001).

Antipsychotics can be used for severe anxiety and psychotic features associated with delirium, but they should be used cautiously and in small doses (e.g. haloperidol 0.5 mg PO BID) due to the QTc prolongation side effects.

26.4.3 Depression

26.4.3.1 Depression as a Risk Factor in Heart Disease

About 15–20 % of patients with coronary disease have depression (Hance et al. 1996; Kessler et al. 2003) and depression is a major predictor of subsequent mortality (Lesperance and Frasure-Smith 2000; Frasure-Smith et al. 2009).

A metaanalysis of 28 epidemiologic studies with nearly 80,000 patients shown depression to be an independent risk factor for cardiovascular disease (Van der Kooy et al. 2007). The relative risk of developing heart disease in depressed but healthy people is 1.64, which is less than that in active smokers (2.5) but more than that in passive smokers (1.25) (Wulsin and Singal 2003).

Major depression (MDD) during the year preceding baseline assessment increased the risk of dying from ischemic heart disease by 2.7 times in the follow-up period (Ishihara-Paul et al. 2008; Surtees et al. 2008a, b).

The prevalence of depression is three times greater in post-MI patients and post-MI depression is associated with 2 to 2.6-fold increased risk of all-cause mortality, cardiovascular mortality, and cardiovascular events in a metaanalysis of 22 prospective studies (Barth et al. 2004).

In *ESCAPE* study (Epidemiological Study of Acute Coronary Syndromes and the Pathophysiology of Emotions), 804 patients were assessed 2 months after acute coronary syndrome (ACS). MDD more than doubled the risk of cardiac death, MI, cardiac arrest, and nonelective revascularization within 2 years (Frasure-Smith and Lesperance 2008; Thombs et al. 2008). Lesperance et al., reported that the higher the Beck Depression Inventory score at the time of hospital admission in post-MI patient, the higher the 5-year mortality rate (Lesperance et al. 2002; Frasure-Smith et al. 2009). Pre-MI MDD was associated with immediate post-MI in-hospital complications such as ventricular arrhythmias, congestive heart failure, and reinfarction (Huffman et al. 2008).

The characteristics of depression affecting morbidity and mortality in MI include first-episode depression around the time of MI and depression within 1 month after ACS.

Severity of MDD in first few weeks of hospitalization for ACS or failure of MDD to improve during the 6 months following ACS predicted more than a doubling of mortality over 6.7 years of follow-up (Glassman et al. 2009).

Forty percent of CHF patients suffer from comorbid depression and is associated with decline in health status and increased rates of rehospitalization . Depression increases cardiovascular mortality and arrhythmic death despite optimized treatment. Depression is associated with longer hospital stay and higher 60–90 day postdischarge mortality (Albert et al. 2009).

INTERHEART study, involving 52 countries, explored attributable risk in the development of myocardial infarction. They found that psychosocial factors including stress, low generalized locus of control (the perceived inability to control one's life), and depression accounted for 32.5 % of the attributable risk for MI, which is slightly less than smoking but greater than hypertension and obesity (Rosengren et al. 2004).

Heart and Soul Study by Whooley et al., was a longitudinal study of more than 1,000 stable coronary heart disease patients recruited from outpatient clinics in the San Francisco Bay Area, 10 % of patients with moderate to severe depressive symptoms had a heart attack, stroke or angina, compared to 6.7 % of patients who were not depressed. Whooley found that depressed patients were in essence less likely to take care of themselves. They were especially unlikely to keep up with any sort of exercise regimen, a factor that was most associated with cardiac events. While people who are depressed may lack the motivation to exercise, a gradually growing number of research studies suggest that aerobic exercise can relieve depression.

Depression was associated with elevated levels of norepinephrine, more inflammation, and lower blood levels of omega-3 fatty acids. But when exercise and other health behaviors were factored in, these physiologic changes did not account for the link between depression and heart disease—only exercise and health behavior mattered (Duivis et al. 2013a, b; Martens et al. 2010; Ruo et al. 2003, 2004; Whooley et al. 2008; Schenker et al. 2009).

This study also found an association between the serotonin transporter promoter gene (SERT or 5-HTTLPR) and several aspects of heart disease. The short allele of this gene has been shown to interact with stressful life events to predict depression in otherwise healthy individuals. Among patients with chronic heart disease, carriers of the s allele of 5-HTTLPR were more vulnerable to depression, perceived stress, and high norepinephrine secretion. These factors may contribute to worse cardiovascular outcomes in these patients (Otte et al. 2007). They also found hopelessness was a risk factor for mortality in cardiac disease even after accounting for severity of depression, and that patients with the short allele of the 5-HTTLPR gene had a higher rate of hopelessness among men but not in women (Kangelaris et al. 2010).

Depression may increase cardiac mortality through the following mechanisms:

1. Increased catecholamine which may lead to increased cardiac activity and oxygen demand as well as increased blood pressure activity (Jewitt et al. 1969; Bouzinova et al. 2012).
2. Changes in autonomic nervous system activity as manifested by decreased heart rate variability, often associated with increased C-reactive protein, may lead to susceptibility to ventricular arrhythmias (Stein et al. 2000; Carney et al. 2001, 2005; von Kanel et al. 2011).
3. Increased tendency for platelet aggregation in patients with coronary disease, which may increase the risk of acute coronary event (Mendelson 2000; Delle Chiaie et al. 2013)
4. Noncompliance to cardiac health regimen—depressed patients tend to be less adherent to medication regimen and to modifications in diet, exercise, and smoking cessation (Bernard et al. 2013; Eze-Nliam et al. 2010; Hitsman et al. 2013; Weinberger et al. 2013; Khawaja et al. 2009; McGrady et al. 2009; Thorndike and Rigotti 2009). Statin use has been associated with decreased risk of depression in coronary disease patients (Otte et al. 2012).

Social support seems to play a protective role for cardiac patients with depression, probably through mitigation of the depressive symptoms (Frasure-Smith et al. 2000). In outpatients with chronic coronary heart disease, depressive symptoms were associated with perceived deficits in doctor–patient communication, while medical comorbidities and disease severity were not, suggesting that patient reports of doctor–patient communication may partly reflect the depressive psychological state of the patient (Schenker et al. 2009).

26.4.3.2 Treatment of Depression in Cardiac Disease

In view of the adverse effects of depression in cardiac outcome, treatment of depression is important in cardiac patients, although just how effective antidepressant treatment remains unclear.

Several prospective studies have been performed concerning psychiatric syndromes including depression and cardiac disease.

SADHART (Sertraline Antidepressant Heart Attack Trial) by Glassman et al., was a multicenter, double-blind, placebo-controlled, randomized clinical trial comparing the safety and antidepressant efficacy of sertraline vs. placebo in 369 patients with acute coronary syndrome and major depression. The results showed that sertraline is a safe drug for these patients, and that it may help prevent recurrent cardiac events, but patients treated with sertraline did not show a significant improvement in depression compared to placebo-treated patients. A 7-year follow-up showed that the severity of depression within a few weeks of hospitalization for acute coronary syndrome or failure of depression to improve during the 6 months following the cardiac event predicted more than a doubling of mortality at

follow-up. Furthermore, marked improvement in depression was associated with improved adherence to sertraline (Glassman et al. 2002, 2009). In a SADHART substudy, depressed MI patients treated with sertraline had substantially less platelet and endothelial biomarker release (Serebruany et al. 2003, 2005). Treatment with sertraline compared with placebo did not provide greater reduction in depression or improved cardiovascular status among patients with CHF and depression (O'Connor et al. 2010).

ENRICHD (ENhancing Recovery In Coronary Heart Disease patients) was a multicenter, randomized-controlled clinical trial. A total of 2,481 patients, average age 61 years, were recruited from eight clinical centers in the United States. Participants in the study had to be in a recovery state after an acute MI (screened during the first 28 days since the MI). They also had to fulfill the DSM-IV criteria of major depression, minor depression with a history of major depression, or dysthymia and the ENRICHD criteria for Low Perceived Social Support (LPSS). The study included women (44 %) and minorities (34 %). 1,238 patients were randomly allocated to CBT intervention with adjunctive pharmacotherapy if needed, and 1,243 to usual medical care. CBT, which aims to modify thought patterns that are associated with patients' symptoms and facilitate change in patients' habits, was given for 6 months. The primary end-points of the study were reduction in all-cause mortality or recurring nonfatal MI. The mean follow-up was 41 months. Although the intervention treatment program significantly reduced depression and significantly increased the level of social support in comparison to the usual care group, it did not lower mortality or the recurrence of MI. Death was recorded in 303 (24.4 %) of the intervention treatment group and 299 (24.2 %) of the usual care group (Investigators 2001; Louis et al. 2002; Berkman et al. 2003; Froelicher et al. 2003; Sheps et al. 2003; Trockel et al. 2008). Many factors are probably responsible for the disappointing results, but it is possible that the usual care given may have been quite effective in preventing mortality or recurrence of MI in this population.

MIND-IT (*Myocardial Infarction and Depression-Intervention Trial*) involved 2,140 patients admitted for MI screened for depressive symptoms at 0, 3, 6, 9, and 12 months after MI . The first-choice treatment was a placebo-controlled treatment with mirtazapine, with alternative open treatment with citalopram for nonresponders. There was no significant difference in depression outcome or new cardiac events when evaluated at 18 months postmyocardial infarction. Mirtazapine responders showed significant increase in tumor necrosis factor compared to nonresponders (Denollet et al. 2009; Tulner et al. 2011).

CREATE (*The Canadian Cardiac Randomized Evaluation of Antidepressant and Psychotherapy Efficacy*) evaluated the efficacy of citalopram and interpersonal therapy (IPT) in reducing depressive symptoms in patients with stable coronary artery disease and major depression. Participants underwent two separate randomizations: (1) 12 weekly sessions of IPT plus clinical management ($n=142$) or clinical management only ($n=142$) and (2) 12 weeks of citalopram, 20–40 mg/d ($n=142$), or matching placebo ($n=142$). Clinical management consisted of 20–25 min sessions on psychoeducation, reassurance, and compliance adherence. Citalopram was superior to placebo in reducing 12-week Hamilton Depression Rating Scale scores. There was no benefit of IPT over clinical management (Lesperance et al. 2007). Citalopram was not associated with decrease in platelet activation markers but it significantly increased production of nitric oxide (van Zyl et al. 2009)

A metaanalysis of SADHART, CREATE, ENRICHD, MIND-IT, and randomized-controlled trials of fluoxetine and mirtazapine showed that treatment of depression with medication or CBT resulted in modest reductions in depressive symptoms but no evidence that depression treatment improved cardiac outcomes (Thombs et al. 2008).

Cardiac Rehabilitation including exercise training, education on heart healthy living, and counseling to reduce stress and help to return to an active life has been shown to have an impact

on depressed cardiac patients. 522 post-acute cardiac events patients with depression who completed cardiac rehabilitation and 179 patients who dropped out within 2 weeks of the start were studied. Depressive symptoms decreased 63 % following rehabilitation, from 17 to 6 % in the intervention group and depressed patients who completed rehabilitation had a 73 % lower mortality (8 % vs. 30 %) compared with control depressed patients who did not complete rehabilitation (Milani and Lavie 2007).

26.4.3.3 Conclusions

Depression is a significant risk factor for new heart disease and increases morbidity and mortality in established heart disease. Mechanisms linking depression and heart disease include serotonergic pathway and platelet dysfunction, inflammation, autonomic nervous system and hypothalamic-pituitary-adrenal axis imbalance, and psychosocial factors.

Drug therapy and psychotherapy have been shown to improve depression but not clearly shown to decrease cardiac morbidity and mortality.

Given these findings, it seems SSRIs are safe and potentially helpful in reducing both depression and cardiac events, probably also owing to their antiplatelet agglutination effect as well as antidepressant effect. Health-promoting behaviors including exercise and smoking cessation are helpful in depressed cardiac patients. Cognitive Behavioral Therapy has been shown to be effective in treating the depression in cardiac patients. In addition to SSRIs, the SNRI, duloxetine, and mirtazapine can be used effectively in cardiac patients (Montgomery 1995; Hudson et al. 2005; Thase et al. 2005; Wohlreich et al. 2007). On the other hand, another SNRI, venlafaxine should rarely be used in cardiac patients due to its dose-dependent increase in blood pressure, QTc prolongation, and other cardiac toxicity (Feighner 1995; Blythe and Hackett 1999; Combes et al. 2001; Letsas et al. 2006; Martinez et al. 2010).

Bupropion is also effective and may help smoking cessation as well, but it lowers seizure threshold and can prolong QTc (Isbister and Balit 2003; Tonstad et al. 2003). Tricyclics, while effective, have strong anticholinergic action and should be used cautiously. They also have more QTc prolonging side effect, as does the SSRI, citalopram (Rasmussen et al. 1999; Catalano et al. 2001; Kanjanauthai et al. 2008).

In addition to drug therapy, cardiac rehabilitation, smoking cessation, exercise, diet, and other life style changes can be effective both in reducing depression and reducing cardiac morbidity/mortality in heart disease patients.

26.5 Acute Neurologic Conditions

26.5.1 Stroke

Some 40–50 % of poststroke patients have depression within 5 years of stroke, and about 30 % have depression 10 years after stroke. The rate of recovery from depression among patients depressed a few months after stroke range from 15 to 57 % 1 year after stroke. Major predictors of depression are disability, depression pre-stroke, cognitive impairment, stroke severity, and anxiety. Lower quality of life, mortality, and disability are independent outcomes of depression after stroke (Lincoln et al. 2012; Ayerbe et al. 2013a, b).

Escitalopram and duloxetine have been shown to be effective in preventing poststroke depression and reducing cognitive impairment (Espinera et al. 2013; Jorge et al. 2010; Zhang et al. 2013; Zittel et al. 2008; Gusev and Bogolepova 2009).

Pathological laughing and crying is seen in 20 % of poststroke patients, and may respond to antidepressants (Andersen 1995).

Disinhibition syndromes, ranging from mildly inappropriate social behavior to full blown mania, may result from lesions of prefrontal cortices, and orbitofrontal and basotemporal cortices of the right hemisphere. (Starkstein and Robinson 1997; Zamboni et al. 2008)

Lesions of the left hemisphere, particularly closer to the left frontal lobe, seem to be particularly associated with depression (Parikh et al. 1987; Tiller 1992; Barker-Collo 2007). Right hemispheric lesions are often associated with agnosias of various kinds including anosognosia (unawareness of deficit) and prosopagnosia (face-blindness)

(Palmerini and Bogousslavsky 2012; De Renzi et al. 1994; Ellis 1994; Beis et al. 2007). Gerstman's syndrome consisting of finger agnosia, right-left disorientation, agraphia, and acalculia, often arises from lesions of the left parietal lobe (angular gyrus and supramarginal gyrus) near the junction with temporal lobe (Jung et al. 2001).

26.5.2 Seizures

At least 50–60 % of patients with epilepsy have psychiatric symptoms, particularly of mood, anxiety, and psychotic disorders (Marsh and Rao 2002). Psychiatric symptoms are particularly common in partial complex seizures, which commonly arise from the mesial temporal lobe, particularly the amygdala, hippocampus, and neocortical regions (Trescher and Lescher 2000). The aura may include such emotions as fear and euphoria, and déjà vu, jamais vu, or depersonalization. There may also be visual disturbance, such as tunnel vision and micropsia or macropsia. Once consciousness is impaired, the patient may display automatisms such as lip smacking, chewing, or swallowing. There may also be amnesia surrounding the seizure event.

Initial assessment should determine whether the psychiatric symptoms are direct expressions of the epileptic seizure (i.e., the ictal state), or features of a periictal state, i.e., postictal or preictal/prodromal phases that are temporally associated with seizures, but are not manifestations of epileptic seizures, or manifestations of chronic nonictal conditions present during the interictal period. Symptoms associated with ictal and periictal states are transient and accompanied by other features of a typical seizure. Nonictal psychiatric conditions tend to persist, and are sometimes chronic. Some patients have more than one disturbance, with different psychiatric symptoms during each phase of the seizure.

26.5.2.1 Ictal Phase

The key features of ictal psychiatric disturbances are the characteristics of a typical seizure—the events are stereotyped, begin suddenly and without provocation, are brief (<1–3 min), and end abruptly. With complex partial seizures, consciousness will be altered, though impairment or confusion may be subtle. There may also be staring, motor or oral automatisms, simple utterances or nonsensical speech, and undirected pacing. Such behaviors or emotions during the seizure will be out of context for the situation and unresponsive to interventions. EEG abnormalities and a postictal elevation in prolactin support the diagnosis of epilepsy (Marsh and Rao 2002).

It is important to note, however, that psychological stress can precipitate epileptic seizures (Fenwick 1991b).

Nonconvulsive partial status epilepticus can manifest as prolonged states of fear, mood changes, automatisms, or psychosis that resemble an acute schizophrenic or manic episode (Trimble 1991). While usually confused, such patients can usually respond to simple commands and questions. *Absence* status epilepticus may be associated with fluctuating states of arousal, blinking, staring, and myoclonic jerks. An EEG may be necessary to confirm the diagnosis of status epilepticus, especially when there is concomitant interictal psychopathology or in nonepileptic psychiatric patients on medications that lower the seizure threshold (Abend and Marsh 2009).

Ictal Anxiety is quite common in epileptic patients. Ictal fear, an extreme feeling of unprovoked terror or panic as a discrete manifestation of epileptiform activity, is often described as 'unnatural'. It may be associated with visual or auditory hallucinations and autonomic phenomena such as hyperventilation, tachycardia, flushing, gastrointestinal upset, or sweating (Betts 1981)

Ictal Depression is less common than ictal anxiety; it was reported to be a part of the aura in 1 % of one large sample of epilepsy patients, and was most common with temporal foci (Marsh and Rao 2002). When ictal dysphoria is reported, the mood state tends to come on suddenly, without environmental precipitants and has a prolonged duration relative to the usual aura or postictal state. Depressed moods can also predominate during status epilepticus.

Ictal Psychosis may be manifest with olfactory and gustatory hallucinations. Ictal visual or

auditory hallucinations typically involve poorly defined shapes or sounds. Paranoid or grandiose thoughts also occur and may be frightening or lead to inappropriate behaviors.

Treatment of Ictal Psychiatric Symptoms should be geared toward the seizure disorder with antiepileptic medications and/or surgery. Psychotropic drugs other than benzodiazepines should be avoided because of their seizure threshold lowering effect.

26.5.2.2 Periictal Psychiatric Manifestations

Preictal (*or prodromal, aura*) disturbances are common, and include irritability, apprehension, mood swings, depression, psychosis, and aggression lasting for several minutes, several hours, or days before a seizure (Blanchet and Frommer 1986). Olfactory hallucinations such as the smell of burning rubber are common aura of seizures. The preictal symptoms can wax and wane, but generally escalate up to the time of the seizure, which relieves the prodromal symptoms (Fenwick 1991a, b).

26.5.2.3 Postictal Psychiatric Conditions

Postictal psychiatric disturbances include diverse motor, somatosensory, autonomic, and cognitive deficits as well as psychosis, and vary in their duration. Some patients return to baseline immediately or within seconds to minutes, even after severe generalized or partial seizures. Others experience significant disability, and may not recover for several hours, days, or even weeks. Postictal psychiatric disturbances may occur either associated with delirium or in clear consciousness. The latter tend to resemble acute interictal psychiatric syndromes, but with a shorter duration, and sometimes a delayed onset following a lucid interval, especially in cases of postictal psychosis. Postictal syndromes tend to remit spontaneously, although antipsychotic medications may be necessary to control symptoms. After recovering from the postictal event, some patients become extremely distressed and worried that the psychiatric symptoms will persist (Kanner et al. 1996; Marsh and Rao 2002).

Postictal psychosis occurs in up to 10 % of patients (Lancman 1999; Marsh and Rao 2002) and tends to develop several hours to a few days after a seizure. The symptoms may include delusions, hallucinations, thought disorder, or manic or depressive mood. Recognition is critical since threatening delusions or hallucinations can result in aggressive or self-destructive behaviors. Relative to interictal psychosis or postictal confusion, there is greater potential for well-directed violent behavior or suicidality. The known risk factors for postictal psychosis include bilateral interictal epileptiform discharges, an aura of ictal fear, a long duration of epilepsy before the onset of postictal psychosis, and the presence of gross structural lesions (Marsh and Krauss 2000; Marsh and Rao 2002).

26.5.2.4 Interictal Psychiatric Conditions

There is an overall higher rate of psychiatric disorders in epilepsy patients compared with the general population (Jones et al. 2011). While more psychiatric disturbances are associated with temporal lobe epilepsy, they can occur in any type of epilepsy. Many factors including the severity of the seizure disorder, cognitive function, and medications including seizure medications may affect the psychiatric symptoms. (Schwartz and Marsh 2000).

Interictal Mood Disorders range from transient episodes of low or elevated mood to persistent mood disorders associated with neurovegetative signs and symptoms such as changes in sleep, appetite, energy, and concentration. *Depression* is quite common in epilepsy patients, especially in temporal lobe epilepsy (Sanchez-Gistau et al. 2010). Depression is also common following surgery for epilepsy, especially in patients with preexisting depression. However, de novo depression following surgery has been reported in about 20–25 % of patients (Foong and Flugel 2007; Garcia 2012). Suicide rate is also increased in patients with seizure disorder (Hesdorffer et al. 2012).

Anxiety symptoms are more common in seizure patients than in general population.

Psychosis may be present in about 7 % of interictal patients (Marsh and Rao 2002).

Reported risks include bilateral temporal foci, seizure clustering, a relative absence of past febrile convulsions and structural imaging abnormalities. Persistent interictal psychoses often involve delusions, usually paranoid or religious in nature, and visual and auditory hallucinations. There is extensive overlap in the phenomenology of nonepileptic schizophrenic syndromes and chronic interictal psychosis (Marsh and Rao 2002).

26.5.2.5 Psychiatric Complications of Antiepileptic Drugs

Antiepileptic drugs may be associated with psychiatric side effects, which may be both negative and positive. Among the older drugs, there seems to be a link between barbiturates and depression, whereas carbamazepine and valproates have mood stabilizing and antimanic effects. Among the newer drugs, vigabatrin, tiagabine, and topiramate have been linked to treatment-emergent depressive symptoms, whereas levetiracetam has been associated with psychosis, dysphoria and mood lability. There is controversial evidence that there may be an increased risk of suicide and suicidal ideation in patients receiving seizure medications (Mula et al. 2013).

Treatment emergent psychiatric conditions associated with antiepileptic drugs
Depression
Barbiturates
Tiagabine
Topiramate
Vigabatrin
Zonisamide
Psychosis
Ethosuximide
Levetiracetam
Phenytoin (toxic levels)
Topiramate
Vigabatrin
Zonisamide
Irritability/emotional lability
Felbamate
Lamotrigine
Levetiracetam

(Based on Mula et al. 2013).

26.5.2.6 Treatment of Psychiatric Syndromes in Epileptic Patients

Drug treatment of epileptic patients should take into account the potential lowering of seizure threshold of the psychotropic medication. Among *antidepressants*, the highest relative risk for seizures occurs with high therapeutic doses of buproprion, clomipramine, and maprotiline and the lowest relative risk occurs with the SSRIs and mirtazapine. *Antipsychotic* agents are associated with a 1 % risk for seizures (Lancman 1999). Among first generation antipsychotics, high potency agents such as haloperidol have a lower risk than low potency drugs such as chlorpromazine. *Clozapine* may cause epileptiform EEG abnormalities and is associated with a dose-related higher risk for seizures. Valproate is commonly used to treat clozapine-induced seizures in nonepileptic schizophrenic patients.(Marsh and Rao 2002)

Carbamazepine should not be used together with clozapine because both have potential risk of agranulocytosis. Recently, the USA FDA has made a labeling change to the drug information contained in carbamazepine. Owing to recent data implicating the HLA allele B*1502 as a marker for carbamazepine-induced *Stevens-Johnson syndrome* and toxic epidermal necrolysis in Han Chinese, the FDA recommends genotyping all Asians for the allele (Ferrell and McLeod 2008). This allele is also found in Europeans in up to 5 % of the population (McCormack et al. 2011).

Newer second generation antipsychotics, such as aripiprazole, risperidone, olanzapine, quetiapine, and ziprasidone are less likely to reduce the seizure threshold (Marsh and Rao 2002; Swainston Harrison and Perry 2004).

Benzodiazepines are used to treat anxiety and they reduce the likelihood of seizure activity. Buspirone lowers seizure threshold in animals and is contraindicated in epileptic patients in British formularies (Marsh and Rao 2002).

Psychotherapy may effectively deal with the anxieties and stigma associated with seizure disorder, and to enhance coping abilities of patients. Cognitive-behavioral therapy, supportive therapy, and group therapy can be useful for anxiety,

depression, and demoralization associated with epilepsy (Dorwart 1984; Cobb 1985; Taube and Calman 1992). Stress management and diet (e.g., modified Atkins diet) may also be effective in reducing the frequency and severity of seizure disorders (Panjwani et al. 1995; Dilorio et al. 1997; McPherson and McEneny 2011; Sharma et al. 2013). Psychoeducation, particularly for epileptic children and families, may be helpful (Aliasgharpour et al. 2012; Brabcova et al. 2012; Noble et al. 2012).

26.5.2.7 Psychogenic Nonepileptic Seizures (PNES)

Consultation-liaison psychiatrists are often asked to evaluate and treat patients suspected of having psychogenic nonepileptic seizure (PNES). PNES often occurs in patients who have history of somatization and under psychologically stressful conditions. Stress may also trigger epileptic seizures and in a recent study. Video EEG monitoring is a definitive diagnostic tool for PNES, but in a recent study, 17 % of patients with PNES also had comorbid epileptic seizures (Asadi-Pooya and Emami 2013). Once PNES is diagnosed, informing the patient of its nature, and providing stress management may drastically reduce recurrence of episodes (Reuber et al. 2005; Arain et al. 2007; Razvi et al. 2011).

26.6 Communication with Patients Who Are Unable to Speak

In the ICU and other acute care settings, psychiatric consultation may be requested for patients who are intubated, heavily sedated, or have other difficulties in communicating. In patients who are heavily sedated or delirious, the extent of sedation/delirium/coma should be ascertained, but a definitive consultation should be postponed until the patient's mental status improves. One important consideration about patients who have communication difficulty (including delirium, stupor, and coma) is that they are likely to be able to hear (and mishear) what others say, although they may not be able to respond or ask questions. One should choose one's words carefully, and not say things the one would not wish the patient to hear.

With an intubated patient, or patients with severe dysarthria, communication may be achievable through writing, or pointing to letters on an alphabet board or keyboard. Specialized computerized communication devices for intubated patients may be available (Etchels, Macaulay et al. 2000). A signal may be agreed upon at the outset of the interview, such as nodding, raising a finger, or blinking, to indicate yes and no, and the consultant may ask leading questions to obtain basic information, such as, "Are you in pain?" "Are you in a hospital?" "A hotel?" "Are you feeling depressed?"

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