MINOR HEAD INJURY: AN INTRODUCTION FOR PROFESSIONALS

From: National Head Injury Foundation, USA

BRIEF STATEMENT OF THE PROBLEM - The past decade has witnessed major changes in the treatment and rehabilitation of traumatic head injury. Improvements in emergency medical services, more aggressive emergency room procedures, and greater sophistication in managing brain insults, have resulted in a greater number of persons surviving head trauma, often with severe disabilities. The development of standardized measures of coma and outcome has given rise to a plethora of studies on long-term recovery. In the field of rehabilitation, there has been the development of remedial techniques and systematic specialized vocational rehabilitation programs for head injured persons. An advocacy organization of families, survivors and professionals, the National Head Injury Foundation has organized support groups nationwide, and is beginning to exert considerable political power. Literally hundreds of head trauma programs have sprung up, it seems almost overnight, both in academically based medical centers, and increasingly in the private sector.

Virtually all of these changes have been concerned with moderate to severe head trauma: situations where there were clearly serious injuries, often life-threatening, with obvious disability and the need for specialized treatment. While the present situation for these head injury "survivors" is hardly ideal, it is clearly where virtually all of the attention, money, research, and program development have been focused.

A number of years ago, while engaged in a head trauma research program at New York University Medical Center, we became concerned with the other, ignored end of the head trauma spectrum: minor head injury. While a number of professionals have written consistently and eloquently in this area, we found gross ignorance and neglect of the long term problems associated with "minor" head trauma: those injuries where patients spent a brief time (if any) in the hospital, made quick medical recoveries, and were discharged directly home without any perceived need for formal rehabilitation.

We discovered, as others had reported, that these patients appeared fine until they attempted to resume their responsibilities at home, work, or school. When they did so, a significant number experienced great difficulty. They complained of inability to remember, concentrate, organize, handle a number of tasks at once, and get as much work done as efficiently as they used to. Their relationships with family, peers, and bosses often suffered, and they developed psychological problems. Their doctors were unable to find anything wrong with them, and they were thought to be having psychiatric problems - or worse yet, to be malingering. They became the bane of neurologists, psychologists, psychiatrists, and vocational counsellors, all of whose usual techniques did not produce positive results.

In such cases the unique problem of minor head injury readily became apparent despite swift and complete physical recoveries, and despite no obvious neurological basis for their problems, these persons were experiencing significant cognitive, emotional, and

behavioural deficits that seriously interfered with their ability to lead fully functional lives.

It is with this syndrome that this booklet is concerned. After defining minor head trauma, we will first consider the nature of minor head injury: the various mechanisms of damage, and the primary deficits (cognitive, emotional, and behavioural) that correspond to each. Next we will consider the consequences of minor head injury: hospital course, return home, and the various scenarios that may follow, focusing on the psychological "overlay" that develops. Finally, we will consider the interventions appropriate to minor head injury:education,types of treatment available,and what some of the elements of success seem to be.

The goal of this program, then, is to increase awareness and sensitivity in a difficult medical/psychological/rehabilitation area that is fraught with complexity and partial understanding. Its audience is all professionals who deal with "mildly" head injured persons, regardless of the nature or level of their expertise.

THE DEFINITION OF MINOR HEAD INJURY - The definition of "minor head injury" we will use in this paper is a practical, not a neurological one: trauma in which the head is struck, or moves violently, resulting in a transient alteration of consciousness, for which the patient is hospitalized for a relatively brief period of time (usually a few days , but often not at all), followed by discharge directly home with no prescription for formal rehabilitation. This definition includes a neurologically diverse group of patients to be addressed below.

The trauma itself may involve a fall, a blow to the head, or (most commonly) the head striking a stationary object, as in a motor vehicle crash. Minor head injury may also occur after a severe whiplash injury, even if the head is not struck, especially (it appears) if the whiplash involves some rotation of the head in addition to linear movement.

The alteration of consciousness usually, but not always, involves some brief loss of consciousness. With moderate to severe head injuries, there is a rough correlation between length of coma and severity of injury (as measured by outcome). Within the group of minor head injury, however, when loss of consciousness lasts less than an hour, there is no demonstrable relationship between length of unconsciousness and severity of problems. Most patients have already "awakened" by the time they arrive at the hospital after minor head trauma, although they might not recall the events for some period of time after the accident, despite being awake and communicating (post-traumatic amnesia).

It is also possible that significant, long-term deficits can occur in the absence of any documentable loss of consciousness. In such cases the alteration of consciousness may take the form of the patient feeling dazed, confused, or agitated for some period of time, even though consciousness was never lost.

THE NATURE OF MINOR HEAD INJURY - The practical definition of minor head trauma used above includes a diverse group of neurological injuries, which are not all equivalent. A basic understanding of the differences will help in understanding the types

of deficits that may occur following a minor head injury. We will consider two major groups of injuries, diffuse mild head injury and focal mild head injury, considering in each case first the neurophysiology of the injury, and then the nature of the deficits. It is important to realize that this is a distinction of convenience, and that the "types" of injury are not mutually exclusive. Consequently, the cognitive and behavioral manifestations that appear in any one person are likely to be a mixture of those described under the various types below.

A. DIFFUSE MILD HEAD INJURY

1. Neurophysiology - A blow to the head leading to a temporary loss of consciousness is known as a concussion. It used to be thought that concussions were purely transient events, akin to a "short circuiting", with no permanent damage to nerve cells in the brain. It has now been shown that this is not necessarily the case. Using both autopsy studies in humans, and special cell-staining techniques in experiments with animals, it has been demonstrated that even minor blows to the head, leading to only brief loss of consciousness, and apparently complete neurological recovery, can result in stretching and tearing of nerve fibers diffusely (i.e. widely scattered, although not random) throughout the brain. These disruptions of nerve processes can only be seen microscopically.

In humans, this means that CAT scans and neurological examinations reveal no observable damage to the brain that can be localized to a particular region. Yet there is evidence that the subjective complaints and cognitive problems encountered by some persons after minor head injury may have an organic basis. This is important information because it means that treating such problems as if they were purely psychological in nature will not make the core problems disappear.

This microscopic stretching and tearing occurs because of the mechanical forces transmitted to the brain during trauma. The brain is not a hard, fixed substance. It is soft and custard-like in consistency, composed of millions of fine nerve fibers, and "floats" in cerebral-spinal fluid within the hard, bony skull. When the head is struck suddenly, strikes a stationary object, or is shaken violently, the mechanical force of this motion is transmitted to the brain. Especially when the head has a rotational movement during trauma, the brain mass itself moves, twists, and experiences forces that cause differential movement of brain matter - much as jello in a shaken bowl will twist and stretch and change its form.

The result of this motion within the brain is that the fine, threadlike nerve cells can become stretched, especially in those area where rotational forces are likely to produce the most strain. When the arousal/activating system of the brain is temporarily disrupted in such a manner, consciousness is temporarily lost. The more severe the forces, the longer it will take to regain consciousness.

Most of the nerve cells will eventually return to normal functioning. Many stretched fibers, however, may be permanently damaged, either functioning abnormally, or becoming totally inoperable (if the stretching progresses to tearing). It is the non-functioning of these cells that theoretically provides the organic basis for the deficits experienced after mild diffuse head injury, and where CAT scans and neurological

examinations turn up mo focal evidence of brain damage. In addition, there is now evidence that the effect of repeated concussions is cumulative. With repeated minor traumas, the severity of the deficits increases, presumably because there is an increase in the number of dysfunctional or non-functional nerve cells.

2. Nature of the Deficits - Because of the very nature of diffuse mild head injury, the resulting deficits are not specific to particular domains of cognition (such as language, perception, etc.). Rather, it is the overall speed, efficiency, execution and integration of mental processes that are disrupted in a general way.

a. Speed and Capacity of Information Processing - Persons with diffuse minor head injury process information less quickly. They react less quickly, especially when faced with a choice, and simply take longer to mentally process most tasks. This goes hand-in-hand with a reduced capacity to process large amounts of information at one time as fewer details can be handled simultaneously. The threshold for becoming overloaded with amount or speed is significantly lowered.

b. Complex Attention - Following minor head injury, most persons have great difficulty splitting or shifting their attention among tasks, and cannot efficiently execute complex operations that require multiple simultaneous decisions and choices - despite the fact that they are perfectly capable of executing any one of the operations independently.

Shifting of attention results in loss of the previously attended-to information, because it cannot be held simultaneously in temporary abeyance. Similarly, flexibility of thinking may be reduced. There is a failure to shift to a new strategy, or to grasp alternative solutions, when the one presently being employed is unsuccessful. As a result of the above difficulties, there is often a decrease in complex problem solving and creative thinking.

c. Learning and Memory - Additionally, failure to effectively sort out, organize, and quickly store complex incoming information often leads to "missing" obvious details, or the inability to recall accurately - and becomes experienced as a problem with "memory". As a result, it is much more difficult to learn new routines, or large and complex amounts of new information. (Disorders of learning and memory will be discussed in more detail later.)

d. Integrative and Abstract Thinking: - Because of its highly integrative nature, there may be deficits in the quality of abstract thinking. The ability to spontaneously make connections between ideas may be impaired, and interpretation of the statements of others may be overgeneralized or too concrete. In more severe cases, there may be failure ro generalize from one situation to another, or conversely, an inappropriate tendency to overgeneralize or fail to make discriminations among situations and adjust behavior accordingly. Finally, there may be difficulty in expressing thoughts concisely and accurately. Ideas may be expressed in an imprecise, roundabout wordy manner. It may be difficult to find the right word, resulting in deliberate speech with numerous pauses, or "talking around" the sought-after word (circumlocution).

Because these deficits are not gross and obvious in casual interaction - or even under the modest demands of the standard mental status exam - they are seldom diagnosed

(or even looked for) in the acute care hospital or the neurologist's office. They emerge only under the rigorous demands of work, school, or running a home (or in the course of a well-done neuropsychological examination.) In addition, these deficits are more likely to occur under conditions of stress, fatigue, anxiety, or even the moderate use of drugs or alcohol.

B. FOCAL MILD HEAD INJURY

1. Fronto-temporal Lesions

a. Neurophysiology - Especially in acceleration-deceleration injuries such as motor vehicle accidents, where the forward-moving head stops suddenly and strikes a temporary object, the sudden cessation of motion causes the movable brain to continue moving forward and collide with the frontal portions of the hard, bony skull. Because of uneven, rough, ridge-like surfaces in the frontal and basal portions of the inside skull, there is a very high likelihood that contusing (bruising) of the surface of the brain will occur specifically in the frontal and temporal lobes (especially the anterior and basilar regions). Because these particular brain regions are particularly involved in the process of planning, organization, and memory these cognitive operations are the ones most commonly impaired after focal minor head trauma.

It is important to note that these focal fronto-temporal contusions may be independent of the diffuse injury that leads to unconsciousness (concussion). Patients with concussions may suffer no bruising to the frontal and temporal areas . Conversely, patients may suffer focal contusions without losing consciousness or suffering diffuse injury. Often however, the two types of damage occur together, and produce overlapping results: a concussion with temporary loss of consciousness is accompanied by some bruising in the fronto-temporal areas. This is the classic closed head injury, occurring most often in moderate to severe injuries. In its mildest form, however, patents may appear quite "normal", and be discharged directly home.

b. Nature of the Deficits - With fronto-temporal focal lesions, deficits are primarily in the areas of learning and memory , planning and organization, attention and concentration, and emotional control.

1. Learning and Memory - Associated primarily with lesions of the temporal lobes, memory deficits are the hallmark of closed head injury. Patients have great difficulty storing and retrieving new information, especially when it is presented quickly, in complex form, or in competition with additional information presented before or after. Depending on the location of the damage, memory problems may be with verbal/auditory information, visual information, or both. Incidental memory is particularly affected: the ability to spontaneously recall information not intentionally memorized (e.g. where one puts the keys upon arriving home). These deficits in storing and retrieving new information severely impair the person's ability to learn new material.

It is important to realize that the deficits in learning and memory are specific to new information. Old learning is generally intact. Thus a person may have total recall of his growing up, but forget where he placed parts or tools. Most commonly, there is also a

deficit in the spontaneous recall of newly learned information. The mechanic may, if asked, know that he needs a certain instrument to tune a car (old learning), but it simply may not occur to him to take that instrument when he goes out on a job (spontaneous recall).

2. Executive Functions - Injury to the frontal lobes is primarily associated with disruption of executive functioning - the process by which we plan, organize, initiate, monitor, and adjust our thinking and behavior. Persons with executive deficits may be unable to set realistic and achievable goals. They may be unable to efficiently plan and organize their thinking or their behavior, and this may manifest itself most dramatically in new and unstructured situations. Persons with executive deficits may be deficient in initiating new activities, once they are planned, and may be misperceived by others as unmotivated. There may be an inability to monitor one's behavior, notice errors or unwanted results, and adjust behavior accordingly. Such persons fail to recognize when their performance is off - whether it involves a work task, or the impact of their behavior on others. Persons with executive deficits may have great difficulty modulating their behavior. They may act impulsively or erratically, or fail to perform tasks in a smooth, continuous rhythm. Finally , executive deficits may take the form of failing to complete tasks as things are abandoned, never brought to completion, or alternately, performance (e.g. a conversation, writing a letter) goes on repetitively.

Finally, a particularly devastating aspect of executive deficits is the failure to recognize one's own deficits. This is part of the problem in self-monitoring. Such persons not only have cognitive and behavioral deficits, but are unaware of them, and therefore unable to spontaneously correct them - itself a devastating deficit.

3. Attention/Concentration - Persons with these types of injuries may also suffer the problems of complex attention described above under diffuse injuries, because of the special role of the frontal lobes in modulating attentional processes. In addition, these persons may be highly distractible (either by internal or external events), go off on tangents when a thought occurs to them, jump quickly from idea to idea in a disorganized manner, fail to attend to periods of time, especially when the material is unfamiliar or complex (this is often reported as a person being "bored" with an activity, such as reading, when engaged in it for any length of time).

4. Emotional and Behavioral Control - Damage to the orbital (underside) portions of the frontal lobes, and basilar and medial aspects of the temporal lobes, can result in the disruption of emotions and behavior. Again, the occurrence of such deficits signals a neurologically more serious injury; yet many patients are discharged home and attempt to return to normal activities unaware that they suffer exactly such deficits.

Emotional and behavioral impairments, when caused directly by damage to nerve cells, can be referred to as "primary" psychological consequences, and may take a number of forms. All, however, are marked by a disruption of the balance between "lower" emotional (limbic) impulses, and "higher" rational (cortical) control, due to the disruption of nerve connections between these two systems.

The person may become impulsive and disinhibited, saying and doing things without forethought that he or she would never have done before. Emotions may suddenly and

unpredictably erupt out of control, only to quickly subside when the context changes, with none of the usual emotional carryover. The person may be irritable and quick to anger, and describe his or her feelings as running "close to the surface". Strongly felt emotions ma be experienced and expressed in extreme form. Arguments may propel to vehemence, and all laughter become hysterical. Moods may fluctuate deeply and rapidly, for no apparent cause, or for minor reasons. Depression or elation may occur independent of environmental events.

Combined with the cognitive and executive impairments described above, the cumulative effect of these emotional and behavioral changes may be that the head injured survivor is experienced by others (but not necessarily by the individual) as "a different person". The individual may relate differently to others, be interpersonally "off", act egocentrically, and respond much differently than he or she used to. The capacity for intimacy may be decreased, and close relationships may suffer. While this is dramatically true for persons with more severe head injuries, even after minor head injury one often hears that the person "just hasn't been the same" since his or her accident.

These effects are felt not only by the head injured person, but by his or here family and friends as well - especially spouses. Personal, sexual, and social relationships may change for both partners, in the direction of increasing isolation, and may lead to disastrous consequences without professional intervention.

It is important to realize that all of the emotional and behavioral changes described above are organically based. That is, they are caused directly by damage to nerve cells as a consequence of the trauma. They are not secondary psychological reactions to the injury or to stress. This does not mean that secondary psychological consequences do not occur; they certainly do, and will be addressed below. However, emotional and behavioral problems can occur directly as a result of the injury, and it is essential (although often extremely difficult in practice) to discriminate one from the other.

This distinction is crucial, because whereas secondary psychological reactions may be amenable to more traditional psychotherapeutic treatment, organically based problems are not. Persons having organically based problems controlling their anger, for example, will simply get worse if encouraged to explore and express their feelings of rage. Such persons will only benefit from a structured, goal-oriented approach that helps them understand the nature of their deficits, (in this case, by learning how to head off or control emotional outburst). The cause of the problems are organic, not psychodynamic, and only a therapist familiar with the nature of head injury will be able to provide the appropriate treatment.

2. Coup/Contre-Coup Lesions

A. Neurophysiology - A second type of injury caused by bruising of the brain by the skull is referred to as a"coup/contre-coup" (literally "blow/counter-blow") injury. This occurs when a particularly sharp blow to the head (usually from some moving object) literally dents the skull inward, bruising the brain immediately below, then sends the movable brain bouncing off the opposite side of the skull, where additional bruising occurs in the

area diametrical opposed. Like fronto-temporal lesions, these injuries may occur independently of, or conjointly with, mild diffuse injury.

b. Nature of the Deficits - Because the location of the bruising depends exactly where the blow occurs, the nature of the cognitive and behavioral problems will depend on what brain areas are damaged. Perhaps by definition, the existence of these impairments makes the injury much more than "minor"; nevertheless, the patient is often treated as if all major problems were resolved, and no formal treatment strategy is implemented.

Such deficits may run the gamut of neuropsyhological impairments, and include (but are not limited to) problems with:

Language (word-finding difficulties; using a word of phrase that is slightly off; wordy, roundabout descriptions; or receptive or expressive aphasia);

Perception (including failure to attend to visual detail, distraction by irrelevant or similar details, and the tendency to: neglect" things on one side, usually the left);

Sensory functions (especially anosmia - the impaired sense of smell);

Motor functions (especially decreased fine motor coordination, manual dexterity, and sense of balance);

Sensory-motor integration (especially motor activities guided by vision, such as copying complex designs, or catching a ball);

Arithmetic calculations; and Sequencing.

These possible deficits, following damage to specific areas of the brain, are of course in addition to the primary deficits in the area of speed and capacity of information processing, complex attention and concentration, learning and memory, integrative thinking, planning and organizing, and control over emotions and behavior, which are the hallmarks of most head injuries.

CONSEQUENCES OF MINOR HEAD INJURY Many head injuries are seen in the emergency room and sent home with a prescription for rest, observation, and return if there is any change in mental status. When a blow to the head results in loss of consciousness, however, hospitalization for purposes of observation and safety usually occurs. These hospitalizations are generally brief, usually a few days to a week, followed by discharge home.

A. Hospital Course and Return Home During this time, the patient may experience a number of changes reflective of insult to the brain, including headache, nausea, dizziness, confusion, disorientation, amnesia, agitation, and fatigue. Generally, these changes abate relatively quickly over time; however, it is not uncommon for some of these symptoms to persist for weeks or even months after discharge. This is especially true of fatigue, which patients often complain of for many months following physical or mental effort. In many cases, these symptoms imperceptibly fade into the background,

and the person gradually resumes responsibilities at home, work, or school, and within six months to one year notices no untoward affects. (In more minor injuries, especially sports injuries, the recovery can be more rapid, with a quick return to functioning.)

In a significant number of cases, however, return to prior levels of functioning is incomplete, and often the extent of functional disability can be quite severe. This is particularly true if the nature of the person's work is such that it requires proficiency in the very areas of speed, complex attention, learning and memory, and integrative thinking, that are most often impaired after minor head injury (e.g. lawyer, business executive, creative writer).

In such cases, not only are the patients unprepared for the difficulties they will encounter, but they have been (implicitly or explicitly) misled into a set of expectations that exacerbate the problems they will encounter. This situation occurs because from a neurological or neurosurgical point of view, patients have already made "good recovery" by the time they return home. They are able to walk, and talk, dress and feed themselves, show no residual neurological abnormalities, are oriented, able to answer questions, and pass a mental screening exam. Moreover, patients do not complain of (are not aware of) any other troublesome symptoms. There is almost never the kind of in -depth neuropsychological examination that would reveal deficits if they existed. The patients are discharged home, without followup treatment planned, are told to rest, and gradually resume their routine. Often patients are reassured that "everything will be fine", that "recovery will be complete", and that any remaining symptoms will eventually disappear.

In some cases, of course, this is true. In other cases, unfortunately, it is for from true. Thus, depending on the nature of the injury, a number of scenarios are possible, both functional and dysfunctional. We will consider some of these scenarios later.

B. FUNCTIONAL SCENARIOS

1. "Complete Recovery"

This is the ideal situation, one in which there is no permanent observable impairment in functioning. Once recovery has taken place, the person never again notices any changes. Often, however, even "complete recovery" occurs in a modified form (hence the quotation marks). For example, the person may notice minor problems with memory or problem solving, but not to the extent that they seriously interfere with functioning, or require any conscious adaptation. Alternatively, the person may experience changes in cognitive recessing abilities, but only rarely and only at certain times - such as under extreme stress, anxiety, fatigue, or after even moderate use of alcohol or drugs. In addition, even after "complete recovery", the occurrence of additional minor head traumas (especially common in sports) may eventually produce noticeable deficits, even though none is any worse than the first - implying that the initial "complete recovery" was really a decrement in nervous system integrity too small to notice behaviorally.

2. Spontaneous Accommodation -

This functional scenario occurs when a person suffers a minor head injury that does result in long term cognitive impairment, but succeeds in a) recognizing and understanding the nature of the deficit, b) lives and works in a manner that is not seriously disrupted by the impairment (e.g. a manual labor with deficits in higher level inter\intergrative thinking), and c) spontaneously compensates for his deficits by making common sense changes in his environment (e.g. relying on a spouse to organize a vacation, or writing down all the chores he needs to do on a weekend). The success of the accommodations may of course be variable, and many persons who later in life develop significant emotional, interpersonal, or behavioral problems, are found to have, upon careful interviewing, a history of minor head trauma at some time in their lives (this is particularly true of patients seen in mental health clinics).

C. PSYCHOLOGICAL OVERLAY: THE SHAKEN SENSE OF SELF

It is not possible to comprehend the devastating impact of apparently minor cognitive changes without understanding the nature of how we maintain our sense of self. "Sense of self" refers to the balance, the integrity , the system of feedback that we all instinctively establish to keep constant our "identity", our sense of who we are. It involves the ability to do certain things and not others, to react and perform in ways that are predictable and expected, and generally run our lives based on what we have learned we are able to do.

Such a sense of self is totally disrupted following minor head injury. It is ironic that the sense of self is more devastated after minor, than after more severe head injury. This appears to be the case because the deficits encountered after minor head injury are unexpected and not apparent to anyone else . Without appearing or feeling any different, the lawyer suddenly is unable to prosecute his cases with the same success. The salesman fails to persuade his clients. The housewife cannot cope with three children and a house to organize. The writer loses her creativity.

When these things begin to happen for no apparent reason , our sense of who we are is shaken. We begin to lose confidence. We begin to doubt ourselves. What was once automatic, we now find ourselves thinking about. We begin to second-guess our every move, and anxiety becomes conditioned to new situations where we worry about that we might not succeed. What differentiates this process from the anxiety of neurosis, is that it is grounded in an organically-based dysfunction. While the anxiety may not build to proportions that go beyond the extent of the original dysfunction, one cannot deal with the anxiety without taking into account the very real dysfunction that fuels it.

Eventually, the anxiety becomes one of the factors fueling the cognitive breakdowns, and the doubt becomes a self -fulfilling prophecy. Confidence in the ability to negotiate life smoothly, automatically, and efficiently is lost; the sense of self is shaken, and may ultimately be destroyed.

The following scenarios illustrate four possible outcomes following a breakdown of sense of self following minor head trauma. They represent secondary psychological reactions, or the psychological overlay, that is so common after a minor head injury. Whereas the primary psychological consequences of minor head trauma (discussed above) are direct consequences of damage to nerve cells, these secondary psychological reactions are

responses to the primary deficits, and complicate and exacerbate the functional problems of the head injured person. Unfortunately, they are part and parcel of that has been dubbed the "post-concussion syndrome", and become both intensified and rigidified the more time passes following surgery.

D. DYSFUNCTIONAL SCENARIOS

1. Failure, Depression, and the Fear of Going Crazy

This is probably the most common of the dysfunctional scenarios following minor head injury. It follows from the jarring conflict between the expectation that recovery is complete, and the reality of immediate and significant failure. It is exacerbated by repeated messages that "nothing is really wrong", and if there is, "nothing can be done about it". It is especially prevalent among persons who are overachievers, have high expectations of themselves, or whose self-esteem is particularly tied to observable achievement.

Following the repeated, unexpected failures, a sense of self-blame and guilt set in, further eroding the sense of self. Depression follows quickly, especially if the sense of meaning and possibility in life is lost. While this depression is usually transient and responds to support, it can become severe enough to lead to suicidal intent or attempt. This usually surprises friends and family who cannot understand why the head injured person is so distraught.

The inability of persons whether to perform in ways the "experts" say they should be able to, or to communicate to others the devastating nature of their inner experience, often leads to the feeling - and fear - that one is "going crazy". One is suddenly living in a world different from and unexplainable to others, where all the rules of thinking, feeling, and behaving are suddenly violated, for no apparent reason, and no one else is taking any notice. This feeling of going crazy will be perpetuated as long as the head injured person feels alone and unique in his or her experience.

2. Conditioned Anxiety -

The prominent feature of this dysfunctional syndrome is anxiety: anxiety about the nature of one's performance, and obsessive anxiety about the decisions, choices, and options in one's life. It follows from the experience of being suddenly and unexpectedly "off" in ways that lead to performance that is experienced as inadequate, embarrassing, or even humiliating. Persons whose self esteem is particularly tied to pleasing others, or who have not developed a resilient sense of self, are especially susceptible to this syndrome. The anxiety that emanates from a negative experience becomes conditioned to other situations where failure might occur.

As time since injury advance, one sees the remarkable phenomenon of sense of self deteriorating while cognitive performance is steadily improving. The two functions, initially linked, become functionally independent as anxiety becomes more generalized and independent of actual failure, and the two curves (cognitive performance and sense of self) actually cross, going in opposite directions.

Obsessive ruminations and indecision often accompany the anxiety, and the syndrome resembles one following traumatic stress. Unfortunately, the co-existing cognitive deficits exacerbate the anxiety in two ways. First, inflexibility of thinking, impulsiveness, impaired problem solving, and intensification of emotions, all conspire to intensify the anxiety and trap the person in its grasp. Second, as the anxiety mounts, the conditions exist to exacerbate, and bring out, the cognitive "weak links" - which in turn fuel the anxiety as performance breaks down. It is this synergistic interaction between anxiety and cognitive deficit that distinguishes the minor head injury syndrome of conditioned anxiety from traditional post-traumatic stress syndrome.

3. Rigid Denial and Lack of Awareness -

This syndrome is less common, less complex, but perhaps the most limiting in that it allows so few opportunities for change. Its hallmark is an absolute inability to recognize the limitations and changes that result from one's injury. The lack of recognition has two components: primarily, an organically based failure to appreciate the existence of one's own deficits (because they are not monitored), and secondarily, a defensive denial and refusal to consider the feedback and evidence that others put forth for changes in behavior and ability. The latter is exacerbated by the deficit of rigidity of thinking that often accompanies the syndrome.

Such persons may suffer repeated failures, and changes in personality and behavior that are distressing in the extreme to their families. Yet their inability to acknowledge the problems prevents them from accommodating in any way. A perpetual standoff may occur until one side or the other is drained of emotional energy. The chronic stress inherent in such a scenario at times can make the head injured person more susceptible to other forms of illness or emotional disorder.

4. Psychiatric Imbalance -

This scenario is the most serious of the four. The quaint phrasing "imbalance" is meant to connote the essential feature of the syndrome: that some basic emotional "balance" central to ego functioning has been lost. Far beyond the psychological erosion of self that occurs with the syndromes described above, this scenario implies an imbalance that distorts the person's sense of reality. Episodes of psychotic proportions result, often characterized by periods of excitement and exuberance, or depersonalized, dissociated states where the sense of identity is literally "lost".

Such scenarios often require psychiatric attention in the form of drugs, hospitalization, or intensive therapy. Again, the nature of the treatment must be informed by an awareness of the concomitant organically based cognitive, emotional, and behavioral deficits. At present, the mechanics of such scenarios are not clear. Perhaps, the trauma of the accident, combined with the changed capacity for performance, act together as a trigger for pre-existing tendencies toward disintegration in a person whose "balance" was tenuous to begin with. Or perhaps in some cases there is a biochemical disruption, organically triggered, which results in psychiatric symptoms. Additionally, in such cases, the nature of the family system, and the person's role in that system appear to be factors in how severe the "imbalance" becomes.

INTERVENTION

A. EDUCATION AND INFORMATION -

The most basic and effective intervention for minor head injury is in early education and information of both the head injures person and the family. Such intervention does nothing to ameliorate the primary deficits, but it is the best course of action for reducing the severity of the secondary psychological reactions. Persons who know what may happen, how to understand it, and what to do, are simply less likely to become enmeshed in one of the dysfunctional syndromes described above. They are less likely to feel self-reproach, the fear of going crazy, or alone in their experience, if the nature of the experience has been predicted and explained.

The best time to initiate such an intervention for minor head injuries is in the acute care hospital. Prior to discharge, patients should be carefully evaluated, and informed not only of the likely scenarios regarding physical symptoms and recovery (which usually happens), but of the non-physical, cognitive, emotional, and behavioral symptoms and recovery as well (which seldom happens).

Of course, the ability to integrate and profit from such information differs drastically from one family to another, and some families may have no interest in hearing about potential problems which don't yet exist. Additionally, the success of such information and education is not guaranteed. Sometimes, the dysfunctional scenarios seem to have an inevitability about them - especially the psychiatric imbalance scenario - that is impervious to educational intervention. Yet all things being equal, there is ample evidence that the ability to anticipate and understand the nature of one's own behavior, especially when disordered, increases one's sense of control and options, and makes a healthy response more likely.

When patients do return with problems, it is important to delve into the source of the problems, and not just to put the patient off with vague reassurances or prescriptions to come back at a later time. Head injury specialists should be identified, and referrals made for consultations early on. In addition, it is appropriate to refer the patient and family to the local chapter of the National Head Injury Foundation (NHIF). If there is not yet a local chapter, contact the national office for assistance.

B. TREATMENT

There is no formula for the successful treatment of minor head injury. Individualized and programmatic approaches are being developed, which combine thorough evaluations, supportive and structured counselling, cognitive remediation, and stress management. Most professional are not in a position to implement systematic treatment strategies. Yet certain elements of successful outcome have been identified, which should aid the professional in guiding the person with a minor head injury in a positive direction. These variables are discussed below.

1. Identification of the Problem -

The most basic element in the treatment of minor head injury is identification of the problem. There is an immediate, almost magical, relief, at the moment when the head injured person feels that someone has pinpointed - and really understands - the nature of his or her problem. Unfortunately, this relief is a mixed blessing. With it comes the dashing of the hope that everything is imagined, that it will all go away, that someday everything will return to normal, the way it was before the accident. Nevertheless, the process of problem identification marks the starting point in the process of rehabilitation.

Complicating the process of problem identification is the question of what kind of evaluation will actually shed light on the nature of the problem. As already discussed, thorough neurological exams (including CAT scans and EEG's) may fail to turn up any shred of neurological evidence, even when there is a legitimate organic basis to the subjective complaints.

Conversely, traditional psychological evaluation may not only fail to identify, but misrepresent, the nature of the problem. The difficulty is that traditional tests of intelligence (the familiar "IQ tests") are largely insensitive to the subtler deficits of minor head injury, and may falsely characterize the patient as having no cognitive problems. This occurs because intelligence tests often utilize brief, structured tasks that tap old learning and skills, and provide ample time to respond under conditions of one demand at a time. These are not the conditions under which minor head injury deficits become manifest, however. Only under conditions of complex, extended, unstructured tasks demanding complex attention, speed of processing, integrative thinking, and planning and organization, will the less obvious, but seriously debilitating, deficits of minor head injury appear.

A competent clinical neuropsychologist has a better chance of testing out the nature of a person's problems after a minor head injury. The clinical neuropsychologist is a psychologist with special training in brain-behavior relationships who specializes in the evaluation and treatment of brain injury. A neuropsychological evaluation is an extended (often 6-12 hours) set of interviews and tests, utilizing both traditional psychological measures, and more refined, specific tests that tap particular cognitive functions under varying conditions. Of course, like any other profession, the existence of the degree does not guarantee competence - and competence does not guarantee familiarity with the issues involved in minor head injury. Nevertheless, the availability of an informed and competent clinical neuropsychologist is a tremendous asset in the stage of problem identification.

2. Support -

A second crucial element in the successful adaptation to minor head injury is that of support. Once the problems have been identified, the head injured person needs to feel the belief and emotional support of family, friends, and (when available) a professional therapist. This support is essential to re-establish the shattered sense of self. It is the belief and support of trusted others that may allow the head injured person to survive the bleakest periods of discouragement and despair. Far from being a token, incidental nicety, the consciously cultivated support and belief in the worth and potential of the head injured person is a crucial variable in the equation of success. Often times, such

support comes most effectively from other patients and families, through contact with the NHIF and its support groups.

3. Neuropsychological Rehabilitation -

This is the most problematical, complex, and controversial element in the successful adaptation to minor head injury. As noted above, traditional psychodynamic psychotherapy is not only ineffective, it may be counterproductive as well. At the other extreme, current styles of rehabilitation emphasize a "cognitive remediation", or "cognitive retraining", approach, focusing on defective cognitive processes, and implicitly "correcting" them.

We are uncomfortable with the current emphasis on "cognitive retraining", because it implies that cognitive deficits are somehow "set right'. This is clearly not the case. The deficits remain and when treatment is effective, they are compensated for - automatically or consciously. The process is essentially a psychological one: limitations are identified, alternate strategies are developed, new automatic behaviors are conditioned, and environmental changes are implemented. A better term for the process might be "neuropsychological rehabilitation". Such an approach utilizes existing methodologies in supportive counseling, behavioral intervention, cognitive therapy, educational remedial exercises, stress management, family systems therapy, and psychodynamic psychotherapy. Far from being a faddish "quick fix", successful treatment of minor head injury requires an integration of clinical and neuropsychological approaches. When it is successful, it is ultimately a psychological intervention.

4. Accommodation -

The successful adaptation to minor head injury is ultimately a psychological transformation captured in the concept of accommodation. Accommodation is the process of recognition, acceptance, and adjustment to a new set of limitations - in this case as a result of minor head injury. It is the culmination of the stages of problem identification support, and neuropsychological rehabilitation. It is the point at which the head injured person is able to reform his sense of self, not grasping futilely at his old self, but recognizing, accepting, being comfortable with and building his life around a new self that incorporates a new set of capacities and limitations.

Some persons never reach this point. If they do not, the process of rehabilitation cannot succeed. Achieving this level of accommodation may require a formal, intensive program, years of individual work, or an intensely meaningful person or experience. To consciously structure and guide this process is the work of neuropsychological rehabilitation. To think that it can be mandated by a set of injunctions or reassurances is to vastly underestimate the complexity of the human psyche - and of minor head injury.

Research

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