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Ethical Treatment of Traumatic Brain Injury

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Traumatic brain injury is a frequently occurring event. Often it is not diagnosed in a timely manner. Neurofeedback interventions have not yet been recognized as a treatment of choice. This lack of acceptance of neurofeedback as a treatment of choice may well be due to a scarcity of published control group studies. In addition, the use of the quantitative electroencephalography, one of the most promising diagnostic and treatment planning tools, has been opposed by the American Academy of Neurology (AAN). Yet sufficient clinical and published research data exist to warrant the use of the quantitative electroencephalography as a supplemental tool for diagnostic and treatment planning purposes and the use of various neurofeedback interventions for overcoming many of the symptoms of traumatic brain injury. Practitioners must remain current on both clinical and research data if they are to practice both ethically and competently. In addition, they must attend to other ethical issues such as informed consent, competence, and practice guidelines and standards.

Introduction

Traumatic brain injury (TBI) occurs when an acute event causes brain injury. The injury can be caused by any blunt force trauma such as a vehicle accident, sports injury, or an explosion. A TBI can affect all aspects of a person's life, including: mental abilities (e.g., attention, problem solving, mood, and mental processing of information), behavior, and personality (Roberts, 2009). When the acute event causing injury is war related (e.g., being exposed to an explosion, seeing comrades injured or killed, or otherwise exposed to an emotionally traumatic event), the individual is also likely to suffer from post-traumatic stress disorder (PTSD). ''A blast strong enough to cause TBI is also powerful enough to produce emotional trauma'' (Roberts, 2009, p. 6). The signature injury of the current Iraq War is a combination of TBI and PTSD. In addition, anxiety and depression often accompany both TBI and PTSD.

Every year, 1.4 million American civilians suffer a TBI (Roberts, 2009). In addition, more than 320,000 service personnel have suffered a TBI during the current war (Roberts, 2009). As such, TBI is an ever-increasing problem and may be one that can be fully or partially addressed by competent biofeedback and neurofeedback practitioners.

Due to increased technology, more information is rapidly becoming available concerning exactly what happens when an individual experiences a TBI, e.g., we know that the brain can be bruised, nerve cells can be stretched or torn, blood vessels can be broken, and toxic levels of neurotransmitters can be released when a nerve cell dies. These toxins can kill other neurons for some time after the actual injury event has ended. Damaged neurons can misfire or become unable to react at all to electrical and chemical signals. External pressure waves caused by an explosion can do extensive damage to various areas of the brain far from the original impact by causing extreme oscillations in the blood and excessive secretion of stress hormones in the brain (Roberts, 2009). Various procedures used by neurofeedback practitioners such as quantitative electroencephalograms (QEEGs), connectivity measures, and various neurofeedback treatment interventions have been shown to be effective in helping those with TBIs cope with daily life and overcome some of the symptoms of the injury (Monastra, 2003; Thatcher & Lubar, 2009).

Diagnosis

One of the problems in dealing with TBI is that traditional methods for diagnosis (e.g., a traditional EEG) often have been unable to identify that an injury has occurred or to identify the area of the brain that has been injured, unless, of course, there has been an external injury to the skull. Monastra (2003) stated that ''TBI is associated with no 'signature' EEG pattern'' (p. 456). Individuals suffering from a head injury may undergo months of suffering with symptoms such as headaches, seizures, nausea, or a lack of sleep without a TBI being diagnosed (Mauk, 2009). Current diagnostic techniques using magnetic resonance imaging (MRI) and computer tomography fail to diagnosis brain lesions associated with TBI in 70% of civilian patients and 44% of military patients (Mauk, 2009).

The use of magnetoencephalography (MEG) and diffusion tensor imaging (DTI) was reported at the Neuroscience 2008 (Society for Neuroscience) conference to be showing

great promise in identifying a TBI (MEG) and for determining the extent of damage (DTI) (Mauk, 2009). In addition, neurofeedback practitioners have for some years now found QEEGs, QEEG databases, and various statistical analyses useful in identifying both the probability that a TBI has occurred and the areas of the brain that appear statistically to be abnormal, e.g., connectivity, power, phase, and coherence problems (Monastra, 2003; Thatcher & Lubar, 2009).

Biofeedback practitioners who plan to provide neurofeedback or other forms of biofeedback for TBI or its comorbidities should be familiar with current diagnostic procedures, and must be ethically and legally allowed and competent to use them, or they should have the diagnosis and perhaps even the QEEG analysis completed by a licensed practitioner who is both competent and legally authorized to complete such a diagnosis (Striefel, in press). The Food and Drug Administration has approved the Neurometrics and Neuroguide QEEG databases for the purpose of legally making a diagnosis (Walker, 2009). The Department of Defense (DoD) uses the QEEG to determine whether navy pilots will be allowed to resume flying after having suffered a TBI (Walker, 2009). In addition, the DoD, the U.S. Department of Veterans Affairs, and the National Institutes of Health consider the QEEG to be the ''standard of care'' for diagnosing TBI (Walker, 2009).

The American Academy of Neurology (AAN) has for years taken the opposite position. In other words, they consider the QEEG to be experimental rather than being a clinically acceptable approach to data collection, analysis, and diagnosis for TBI (Thatcher & Lubar, 2009). The AAN seems to believe that EEGs should be analyzed and interpreted visually by a qualified neurologist (Thatcher & Lubar, 2009). The negative position of the AAN has influenced many insurance companies not to pay for QEEGs. The AAN seems to ignore the published studies that clearly point out the utility of the QEEG (Thatcher, Biver, & North, 2003; Thatcher & Lubar, 2009). Perhaps the position of the AAN is one of protecting turf—After all, why would one need to have a neurologist if an EEG can be more accurately and validly interpreted by a computer?

When making a diagnosis, a QEEG is generally used in combination with other tools such as a good intake history, various clinical scales (e.g., Glasgow Coma Scale and the Mild TBI Scale), and other technological tools such as a MEG, DTI, or MRI. It is important to remember that the laws concerning who can legally make a diagnosis or treat a condition like TBI, PTSD, anxiety, or depression vary from state to state and discipline to discipline. Some practitioners can only provide treatment for a condition like TBI if they are under close supervision by an appropriately licensed practitioner. Some practitioners seem to acquire new skills such as being able to collect a QEEG and then assume that they can make a diagnosis or provide treatment, even when prohibited from doing so by state law. Caution is encouraged on the part of all practitioners to ensure that one only practices in areas in which one is both competent and legally allowed to practice, unless of course, under appropriate supervision. Great harm can be done to the reputation of a neurofeedback practitioner and to neurofeedback per se if a client is injured or if there is negative publicity about practitioners operating illegally. In addition, illegal activity has negative consequences such as fines, imprisonment, and the loss of the right to practice.

When a diagnosis of TBI is made, it is important that all comorbidities, e.g., PTSD, anxiety, and/or depressive disorder, also be diagnosed appropriately and that treatment plans be made to include treatment for all of these comorbid conditions. In some cases, it is expected that a practitioner will refer the client elsewhere for treatment of some or all of the comorbidities, e.g., when he or she is not competent to provide the treatment and does not have appropriate supervision available.

Efficacy

Yucha and Montgomery (2008) rated biofeedback treatment of TBI at a level 3 (*probably efficacious*) out of a possible score of 5 (*efficacious and specific*) because published control group studies are lacking, but various authors, e.g., Thornton (2000) and Walker, Norman, and Weber (2002), reported improved outcomes after treatment in case studies. The rating of 3 seems to be based largely on the lack of controlled outcome studies rather than on a lack of outcome data per se. For example, one study using the low energy neurofeedback system reported improvements on a wide variety of symptoms of TBI with 100 patients. The improvements far exceeded the likelihood that the outcomes were due to chance alone (Larsen, Harrington, & Hicks, 2006).

Yucha and Montgomery (2008) rated the efficacy of biofeedback treatment of PTSD at level 2 (*possibly efficacious*), anxiety at level 4 (*efficacious*), and depressive disorders at level 2 (*possibly efficacious*). Successful outcomes in the treatment of TBI and its comorbid conditions may well include a combination of treatments including neurofeedback, medications, and cognitive behavior therapy.

Trudeau (2001) compared the results of randomized controlled studies with those of observational case studies and reported that the results obtained via the two methods

are similar in validity. As such, the lack of controlled studies itself does not preclude the use of neurofeedback interventions in the treatment of TBI; rather, it requires that practitioners take extra precautions to ensure that the ongoing informed consent process is complete, accurate, and well documented (Striefel, in press).

Practitioners need to remain current on the treatment outcome data if they plan to use neurofeedback, neurotherapy, or other interventions for treating TBI and associated conditions. Competence in existing neurofeedback interventions, e.g., the use of QEEGs, databases, statistical analysis of power, coherence, and phase (Thatcher &Lubar, 2009), and the use of more expanded measures of connectivity (Collura, 2008) are essential for understanding brain abnormalities and possible supported interventions that are appropriate.

Treatment and Treatment Planning

A treatment plan should be developed not by trial and error, but rather should be based on best practices that seem to require at minimum the use of a QEEG and a normative database. Demos (2005) stated, ''QEEG data acquisition and brain mapping have become the standard for the industry for clients with a history of traumatic brain injury'' (p. 98). In addition, a good intake history, various assessment scales, existing medical records, correct diagnosis, and baseline data are all important in the treatment planning process. The creation of a treatment plan provides the client with evidence that the practitioner has a plan for helping the client with his or her problems. The more the client is informed and involved in the development of the plan, the greater the client's motivation is likely to be in ensuring that the plan is followed or modified if it is not working. Demos (2005) provided a fairly comprehensive discussion of treatment planning issues, including what to do if the planned intervention is not working.

Treatment and treatment planning require practitioners to attend to all of the issues of professional competence, informed consent, scope of practice allowed by state law, being current on both the research and clinical literature, billing and insurance, practice guidelines and standards, professional boundary issues, side effects and contraindications, and assessment of client outcomes (Striefel, 2004, 2009, in press). The development and implementation of a treatment plan should not be taken lightly. To date, a wide variety of neurofeedback and other interventions have been used successfully to deal with some or all of the symptoms of clients suffering with TBI (Monastra, 2003; Thatcher & Lubar, 2009; Yucha & Montgomery, 2008).

Walker, Coben, and Hudspeth (2008) reported that Joe Horvat was the first biofeedback practitioner to recognize the importance of altered connectivity in the brain after TBI. He used coherence training (one form of connectivity) to treat the symptoms of such patients. Collura (2008) concluded that ''training to the norm or average seems the most logical and intuitive approach to NF [neurofeedback] training of connectivity measures'' (p. 109). Joffe (2008) pointed out that researchers and clinicians alike will need to clarify how clinical decisions are made when they use connectivity in assessment and/or treatment with clients/patients. This includes, for example, what connectivity links will be trained, in what priority, and which, if any, connectivity links will not be trained (Joffe, 2008).

Conclusion

TBI is an ever-increasing problem for which competently applied QEEGs and neurofeedback have much to offer. Clinical and case study data have repeatedly included summaries attesting to improvements in the symptoms of TBI after appropriately applied neurofeedback and other ancillary interventions. Care needs to be taken to obtain carefully documented, full informed consent. In addition, all comorbidities need to be diagnosed and treated. Practitioners should ensure that they abide by all ethical guidelines and standards and adhere to all relevant laws.

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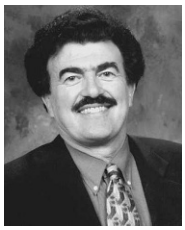

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