

Clinical Neurofeedback and Hypnotherapy as An Integrative Treatment for Tics and Tourette Syndrome

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Abstract

Tourette's syndrome is characterised by involuntary tics, repetitive movements and vocalisations and can lead to significant disturbance when engaging in daily activities. Clinical neurofeedback is based on the concept of the neuroplasticity and the mechanism of action is operant conditioning. Clinical neurofeedback has been found to be effective in improving brain function. Clinical hypnotherapy is said to deal with the unconscious processes of the mind and can be used to help treat a variety of disorders. In this case study, with a client diagnosed with Tourette's syndrome, intervention included a combination of clinical neurofeedback and hypnotherapy. This combination of interventions led to a significant improvement in the client's condition over time. Future studies might make more use of psychological testing to understand client's progress and also include long term follow up.

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1. Background

Clinical neurofeedback has been found to be helpful in many areas such as attention deficit hyperactivity disorder, obsessive compulsive disorder, anxiety, insomnia, depression, tics and Tourette's syndrome. (Harris, Hundley, & Lambie, 2019; Barzegary, Yaghubi, & Rostami, 2011; Kouijzer, Schie, Gerrits, & Moor, 2011). In this case study, clinical neurofeedback is used in combination with clinical hypnotherapy as an intervention. Clinical hypnotherapy is integrated with habit reversal training. There is evidence that habit reversal training can alleviate motor and vocal tics. (Piacentini, & Chang, 2006). There are numerous research and medical studies investigating Tic disorder, but studies on the pathophysiology, causes and effective interventions are limited. (Bronfield & Bar-Grad, 2013).

1.1. Tourette Syndrome or Tics Disorder

Tic disorders can be differentiated into three types. These are Tourette Syndrome (TS), chronic tic disorder (vocal or motor type) and provisional tic disorder (Fontenelle & Yucel, 2019). Motor tics (simple or complex motor tics) and vocal/phonic tics (simple and complex vocal tics) are two characteristics of tic disorders (Fontenelle & Yucel, 2019). Simple motor tics include eye blinking, head jerking, jaw movements, shoulder shrugging, neck stretching, and arm jerking. Complex motor tics include hopping, twirling and jumping (Fontenelle & Yucel, 2019). Simple vocal tics include sniffing, throat clearing, grunting, hooting, and shouting. Complex vocal tics include words which may or may not be recognisable or it could be socially unacceptable words (Fontenelle & Yucel, 2019). TS is characterised by involuntary tics, repetitive movements and vocalisations (Fontenelle & Yucel, 2019). Individuals diagnosed with TS experience at least two motor tics and at least one vocal/phonic tics over the course of more than one year (Fontenelle & Yucel, 2019). Typically, it will start between the ages of 5-7 years old and becoming more severe between the ages of 8-12 years old (Fontenelle & Yucel, 2019). If a person suffers from either motor tics or vocal/phonic tics for more than one year then they can be classified as Chronic Tic Disorder (Fontenelle & Yucel, 2019). If the tics were present for less than 1 year, then they can be classified as provisional tics disorder (Fontenelle & Yucel, 2019). Individuals with TS are at a high risk of having comorbid major neurodevelopmental and neuro psychiatric conditions such as Attention Deficit Hyperactivity Disorder (ADHD), Obsessive Compulsive Disorder (OCD), learning difficulties, behaviour problems, anxiety, mood issues, social skills deficits or sleep related problems (Fontenelle & Yucel, 2019).

1.2. Intervention utilising clinical neurofeedback and clinical hypnotherapy

Clinical neurofeedback has been used as a treatment for a variety of conditions for over 50 years. It has proved to be helpful in cases such as Attention Deficit Hyperactivity Disorder (ADHD), Obsessive Compulsive Disorder (OCD), Anxiety, Insomnia, Depression, Tics & Tourette's Syndrome. (Harris, Hundley, & Lambie, 2019; Barzegary, Yaghubi, & Rostami, 2011; Kouijzer, Schie, Gerrits, & Moor, 2011). In this case study, clinical neurofeedback training will be utilised and combined with clinical hypnotherapy. Clinical hypnotherapy has been acknowledged as an evidence-based therapy tool by various medical councils in the world and been shown to be helpful in the treatment of various medical and other conditions (Abbott et al, 2000; Kaya & Alladin, 2012; Lam, 2013; Sharma et al, 2020) In this case study, clinical hypnotherapy will be further integrated with habit reversal training (HRT) to help manage tic disorder symptoms. Habit reversal training (HRT) can be regarded as an evidence-based intervention for Tics & Tourette's Syndrome (Dutta & Cavauna, 2013). It has been found to alleviate motor and vocal tics (Piacentini, & Chang, 2006, Viefhaus et al, 2018). After clients have been able to utilise self-hypnosis techniques combined with habit reversal training, they were able to learn to deal with stressors and remain calm.

2. Case Presentation

2.1. Symptoms & Previous Intervention

J is a 12-year-old student who suffers from Tourette's Syndrome. She developed tics symptoms from around the age of 9 years. Her symptoms were mainly vocal tics (barking sounds) along with some motor tics. The client had adjusted her diet according to advice but had not undertaken any previous treatment for her Tourette's Syndrome.

Discussions indicated that the severity of vocal tics symptoms was the major concern. It was suggested over the past 3 years she has tended to shift from one tic symptom to another. The client's symptoms reached criteria for a diagnosis of Tourette's Disorder according to DSM-5 criteria.

2.2. Initial QEEG Assessment

A QEEG (quantitative electroencephalogram) assessment was undertaken. This was indicative of widespread excess amplitude low frequency activity relative to the database. Results were also indicative of poor alpha blocking. In other words, alpha activity was appropriately present in posterior regions of the cortex in the eyes closed condition but there was very little attenuation of alpha when eyes were open.

3. Methodology

3.1. Psycho-education phase

Procedures and interventions were explained to the client. The client's caregiver was also guided as to how she may provide appropriate support as well as how to communicate with the school and co-workers effectively to reduce conflict and misunderstanding which might derive from tic symptoms. It was also explained that Tic Disorder was not a bad habit but a neurological disorder which cannot be reduced through training programs utilizing positive or negative reinforcement. In fact, such an approach is likely to worsen

symptoms (Essoe et al., 2019). It was important to ensure that the client did not continue to hold self-defeating beliefs. Discussions aimed to provide the client with confidence but also aimed at setting realistic expectations.

3.2. Clinical Hypnotherapy

Through clinical hypnotherapy, the client was helped to identify how various environmental factors may worsen, maintain, or improve symptoms. While in a hypnotic state the client was asked to observe her own behaviour before and after the tic occurrence. Clinical hypnotherapy was also applied to help to deal with the detected irrational feelings, cognitive distortion and unhealthy coping techniques.

While under clinical hypnotherapy the client was asked to observe all her tics in detail and reflect about how it feels in particular muscle group. She was also asked to feel the discomfort in her body. During this stage HRT was incorporated in the therapy, a procedure to increase awareness of the premonitory urge. Thus, the client managed to notice more clearly how it feels before the tic occurs. Clinical hypnotherapy then focused on asking the client to become more comfortable with the premonitory urge, so as not to react to it with tics. Thus, the goal was for the client to be able to control the premonitory urge prior to the tic happening. After the client became more aware of the premonitory urge, competing responses were identified. During the clinical hypnotherapy session, an intentional movement that could prevent the tic from happening was suggested. Following the initial sessions of clinical hypnotherapy, hypno-exposure therapy was used to reinforce the competing response (e.g., imagining oneself doing the competing response). The client's parents were also actively involved in the session in order that they could help guide the client to practice using habit reversal at home.

Clinical hypnotherapy was also used in conjunction with progressive relaxation in order to help reduce the stress response. Tics are commonly known to become worse when triggered by stress (Buse et al., 2016). The client was asked to progressively tense and then relax different muscle groups while also performing self-hypnosis. An audio recording was used to guide and reinforce the muscle relaxation practice. The client was taught to utilise this technique whenever she needed to stay calm and relaxed.

3.3. Clinical neurofeedback training

Clinical neurofeedback training protocols were guided by the QEEG results and also informed by symptoms. Sensory motor rhythm training was implemented across the motor strip (C3 and C4). The SMR rhythm is said to represent an idling rhythm of the cortical sensory region of the brain (Kubler & Mattia, 2016). Furthermore, the research has found that rewarding SMR and inhibiting theta brain waves across the motor strip has helped to improve the symptoms of tic disorder (Messerotti et al., 2011). Given information obtained through the QEEG assessment, it was also decided to reward SMR frequencies and inhibit theta, delta and alpha brain frequency over the motor strip (C3, C4). It was also hypothesised that sensory training in the parietal area (P3 and P4) would help improve sensory processing as well as limb sensation, the parietal lobe being centrally involved in somatic sensation, touch sensation, and limb position (Perry & Ablon, 2019). The parietal lobe is also closely associated with somatic sensory, visual auditory and spatial awareness, as well as providing information to the motor system of the brain (Goldberg, 2001). It has also been found that the parietal lobe is involved in the guidance of voluntary motor action of the body (Hyvärinen, 1982). Thus, the current study chose to reward sensory motor rhythm and inhibit delta, theta, and alpha frequencies. This was based partly on symptoms but also on the findings of the QEEG assessment. The main objective for clinical neurofeedback training was to increase the sensory motor rhythm ratio rather than increase the amplitude of the sensory motor rhythm brainwave frequency itself. Thus, a central task was to inhibit the delta, theta and alpha frequencies. The client undertook 21 sessions of training using protocols at C3, C4, P3 and P4. Treatment took place over a 3-month period and included 21 sessions of clinical neurofeedback training. Table 1 provides the details of the clinical neurofeedback sessions.

Table 1: Clinical Neurofeedback Session

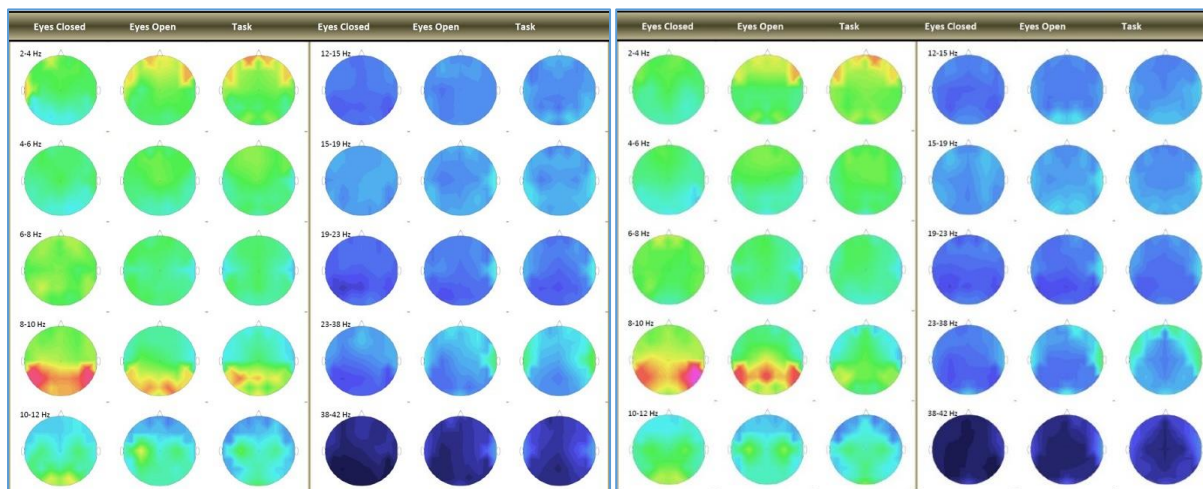
Month	Session	Treatment Protocol
March	Session 1 – Session 7	
April	Session 8 - Session 14	C3 SMR, C4 SMR
May	Session 15 – Session 21	P3 SMR, P4 SMR
Total session	21	

*All protocols training was focused on inhibiting delta, theta, alpha and hi-beta brainwaves. The main objective is to increase SMR when compared with delta, theta, and alpha brainwaves ratio.

4. Results

The post QEEG assessment was somewhat similar to the pre-assessment though assessment indicated less sites where alpha blocking was noticeable. This was especially the case for QEEG measures undertaken while the client undertook a task. Figure 1 shows QEEG maps for pre and post assessment.

Feedback was obtained from the client's parent. They reported a significant change in the client's symptoms. It was reported that there was a significant reduction in vocal tics and some improvement in motor tics. When undertaking a task, she tended to be tic free. It was also noted that the client had significant improvement with sleep onset. There were also indications of improvement in the client's mood and motivation.



(a) Pre-Assessment

(b) Post-Assessment

Figure 1: QEEG maps

5. Conclusion

While this case report indicates some promising results, it is clearly limited to a single case. Furthermore, there is no direct measure of the client's tics. Results are based upon the client's parents report. Future research might provide more detailed psychological testing and objective measures of the number of tics in order to track client's progress. Follow up assessment to observe long term results would also be worthwhile. It would also be worthwhile to undertake research to compare the effectiveness of clinical hypnotherapy and habit reversal training for the treatment of TS with and without the inclusion of clinical neurofeedback intervention.

This case illustrates that QEEG guided clinical neurofeedback training might be combined with clinical hypnotherapy along with HRT as a promising intervention for treating people with tic disorder and/or Tourette's syndrome.

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