

Neurophysiological Rehabilitation and Skills Optimization Strategies as Applied in Autism Related Sensory-Motor Disorders

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This paper is a summary of our presentation at Autism 2002 in Kamloops BC. In our 18 years of medical experience of using neurophysiological assessment and treatment of post-injury patients we found that post-head injury victims commonly exhibit a large overlap of symptoms to those diagnosed with Autistic Spectrum Disorder (ASD), Asperger's syndrome in particular. Both post injury and Autistic categories were seen to respond to a specific medical neurophysiological treatment approach. Only patients diagnosed with Autistic Spectrum Disorder who have been identified as not having actual tissue damage in the brain could respond.

Sensory-motor dysfunction can adversely affect cognitive skills, learning abilities, emotional stability, and intellectual performance.

Objective specific sensory-motor assessment may allow for very early screening of ASD related symptoms in children, as a functional level of speech or cognition may not be necessary to obtain measurements.

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Introduction

The goal of this article is to bring awareness about the relationships between sensory-motor disorders and physical, cognitive, emotional, and intellectual impairments and related behavioral disorders.

Autistic Spectrum Disorder can include a wide range of symptoms of various degrees making it difficult to diagnose. Also early detection has been difficult in young children when speech and cognitive skills are not yet fully developed. Why is it that the physical structure of brains from those diagnosed with Autistic Spectrum Disorders, and Asperger's syndrome often appear to be healthy yet experience dysfunction?

In the early 1980's in France, medical and neuroscience based research with injured pilots, athletes, and other types of trauma patients found evidence that a medical neurophysiological approach was key to understanding why a post-traumatic brain, which has been confirmed as having anatomical integrity with advanced imaging technology, could still not be functioning correctly.

Medical Neurophysiological Paradigms

Medical neurophysiology covers the study of how the Central Nervous System (CNS) regulation and associated control systems are impacted with an injury (Baron and Fillizoat, 1964); Souvestre,1993). The study of the sensory-motor control system further defines how the input received through the senses relates, affects, and is affected by, the output of the body actions, coordination, etc. through the nervous system (Paillard, 1976; Gauthier, Blouin, Vercher and Souvestre, 1993). This phenomenon has been defined since the early 1980's by the anatomophysiological concept of the Fine Postural System (FPS) which appears to be related to sensory-motor controls underlying posture and gait adjustment, coordination, sense of space and time, trajectory control, and related cognition. During the same period, a clinical syndrome relating to FPS was recognized in Europe and labeled Postural Deficiency Syndrome (PDS). This syndrome includes physical, cognitive, emotional, intellectual, and behavioral symptomatologies (Da Cunha, 1987). The sensory-motor interconnection and integration points are localized in several areas at the base of the brain underlying the core of the central perception and adjustment strategies to environmental changes occurring around an individual. So, the core phenomenon of a major trauma will translate into impacts to the brain which affect correct functioning of the sensory-motor system (Souvestre 1993) even though all the systems involved are still physically intact.

A sudden brutal injury, prolonged oxygen deprivation, or a gradual functional overload built up in a given area, which are the most commonly observed causes, may affect either one or both the input, the quality of incoming sensory information, or the output, the ability of the body

to perform an action or reaction (Souvestre, 1992). These can “shut down” the associated neural circuitry to protect the core control systems. Several models, each reflecting different angles of approach to the sensory-motor regulatory system have been developed and tested over the last 30 years with more or less success (Souvestre,1993a and b). In the last 15 years, biological cybernetics and neural network theories have opened a wide global and intimate knowledge about the laws and limitations of neural plasticity and related therapeutic potentials (Prablanc, Echallier, komilis and Jeannerod, 1979). Neural plasticity is the ability of the CNS to change in order to optimize, or replace, functionality which has been challenged, or lost, from a given cause.

Beyond 6 months after trauma, we have found evidence that the origin causing symptoms appears to shift from a given layer of the nervous system upward to higher levels of control in the CNS, meaning a shift in central neural strategies. In essence, we understand that part of the sensory-motor controls have become “dys-functional” (shut down in the worst case) and the remaining clinical condition will then plateau (due to the change in neural strategy) and becomes “chronic” and “resisting” since it can no longer respond to the usual treatments which target the original layer (Souvestre, 1993).

Beyond this point, the only therapeutic approach we have seen these type of conditions respond to is to 1) identify the sensory-motor dysfunction resulting from conflicts within the CNS, 2) correlate these dysfunctions to the clinical condition, 3) specifically assess and evaluate the gain of functional recovery potential, and 4) stimulate the cranial neural network areas which relate to the dysfunctional sensory-motor circuits, so their functionality can be restored or even

optimized. The clinical treatment methodology which has seen continued success in this area the last 18 years relies on a drugless suite of procedures and protocols directed at the cranial nerves. These brain stimulations are used as both part of the assessment, and are core to the treatment phase which occurs over a number of weeks or months, as required. (Souvestre, 2001).

Factors such as age of the patient, or time since the traumas have been proven as not detrimental to the success of this approach. Treatment with this modality may allow reduction or elimination of dependence on drugs used to manage symptoms. In recovery from trauma, these protocols have been shown to speed up recovery time.

About the Symptomatology Understood in Autistic Spectrum Disorders

Given the new understanding of the physiopathology relating to prolonged PDS leading to plateaued Chronic Resisting Conditions (CRC), this approach was originally used to address the problem of how to rehabilitate, in a drugless way, injured or overworked pilots and athletes, who had suffered an accident or chronic occupational constraints over several years.¹

Pilots are athletic, coordinated, quite dexterous, and have strong skills in multitasking, are very self directed, shift gears all the time, have flexible decision making skills, a strong sense of continuity.

Interestingly enough, after even these highly fit professionals experienced one or more traumas or concussions, they began exhibiting symptoms such as sensation of being out of it,

communication dysfunctions, emotional outbursts, difficulty in making transitions, single track mind, all or nothing responses, and loss of sense of continuity, blockiness of movements, loss of coping to environmental stress, anxiety attacks, fear of making decisions, confusion, and hypersensitivities.

These symptoms significantly overlap those diagnosed with an Autistic Spectrum Disorder, especially Asperger's syndrome.

The sensory-motor control system underlies physical perception and action, cognitive, emotional, and intellectual functions. We have identified that symptoms relating to dysfunction in these areas include the following:

- Feeling vulnerable
- Sense of loss of control
- Hypersensitivity, experienced as “environmental overloads”
- Chronic fatigue
- Fear and panic
- Cognitive disorders
- Balance and dizziness problems
- Accident proneness
- Motor control, coordination and trajectory control disorders
- Visual perception disorders
- Chronic pain
- Cognitive disorders, such as mental focus, learning difficulty, concept association

- Emotional outbursts
- Postural disorders
- Hyperactivity

In our opinion and in respect to Autistic Spectrum Disorders, especially Asperger's syndrome, these same symptoms may result from a variety of "conflict" modalities within the cognitive, sensory-motor, and related neuro-hormonal control areas. At this stage we are not certain if the nature of the cause of ASD, either genetic, or damage or dysfunction from trauma or degenerative sources, would affect the potential resolution of these conflicts.

In our experience, these symptoms only appear to be able to respond to a neurophysiological treatment only if the central neural circuitries involved are dysfunctional. All Autistic symptoms can be assessed from this modality, regardless of cause or treatability. The assessment can also determine which symptoms are caused from damage or dysfunction within the CNS.

The Importance of Sensory-Motor Assessment

In order to measure the functional status of the sensory-motor control system, sets of responses to specific stimuli can be objectively and reproducibly measured against normal parameters. Such an evaluation allows to link clinical and psychological symptoms to underlying neurophysiological mechanisms.

Furthermore, a response can be 1) normal, 2) abnormal (dysfunctional), or 3) no response, which means damage. In our clinical experience, there are often many shades of gray between these classifications due to the anatomical complexity and integration of the CNS functional hierarchy. Responding areas which fall outside of normal patterns are labeled as “dysfunctional”, or functional but functioning incorrectly.

Identifying the type and measuring the degree of response of a dysfunctional circuit to stimulation during the assessment phase will reliably provide the clinician with a strong predictor to the treatment outcome.

Because of the nature of the CNS functional integration, testing other components of the sensory-motor regulatory system may allow the clinician to develop conclusions, particularly when the patient is a young child and does not yet have a developed level of cognition or speech. As we all know, early detection of ASD tendencies in children will be important in allowing earliest possible intervention.

This type of neurophysiological assessment applies well in monitoring progress or deterioration observed in a given condition or under specific circumstances.

Conclusion

In our experience, a medical neurophysiological approach allows assessment of the central sensory-motor control status which underlies clinical symptoms experienced by patients diagnosed with Autistic Spectrum Disorder, Asperger’s syndrome in particular.

These assessments include stimulation to determine neural network responsiveness within the CNS. They demonstrate whether the condition is treatable using specific medical neurophysiological treatment.

Such neurophysiological screening can allow early diagnosis and intervention. Treatment success does not appear to be prevented nor limited by age of the patient nor by the duration of the condition.

Specific medical neurophysiological assessment results can correlate and explain both medical diagnosis and neuropsychological conclusions. This is because such sensory-motor controls system appears to be the common denominator underlying both the physical and mental components of an individual's interactive performance with environment and other persons.

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