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CranioSacral Therapy to Address Post-Concussion Syndrome

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TIME TO READ: 15 MIN.

Concussion, traumatic brain injury and post-concussion syndrome have been in the news for several years now, with professional and school-age athletes alike suffering from these injury-caused conditions. The Centers for Disease Control and Prevention (CDC) reports that “from 2006 to 2014, the number of TBI-related emergency department visits, hospitalizations and deaths increased by 53%.”

The effects are serious and can be long-lasting. One therapy that has shown promise for treatment is CranioSacral Therapy as developed by John Upledger, DOO, OMM (1932–2012). CranioSacral Therapy is a gentle, noninvasive manual therapy that detects and modifies restrictions in the craniosacral system as well as strain patterns throughout the body. Of course, it is essential to remember that neither massage therapists nor CranioSacral therapists diagnose; however, the therapist may be in a place to address such a condition if on a medical team or the recipient of a referral.

What is Concussion?

Concussion is considered a mild traumatic brain injury, and is a complex pathophysiological process affecting the brain that may or may not involve a loss of consciousness. Traumatic brain injury is defined as “a disruption in the normal function of the brain that can be caused

by a bump, blow, or jolt to the head, or penetrating head injury,” according to the CDC.

Concussion can also occur via biomechanical forces taken in elsewhere in the body, such as a hard fall on the sacrum, a hard hit to the body, or the forceful movement of the head without any direct contact with an object, such as in a whiplash injury. The forces generated are transmitted to the head and brain as well as the entire body, causing the brain to move, often violently, within the cranial vault, with ensuing injury.

What is Post-Concussion Syndrome?

Post-concussion syndrome describes a group of three or more symptoms that persist after a concussion, sometimes for months or years. Common complaints include headache, cervical pain, photophobia and visual dysfunction, noise sensitivity and tinnitus, dizziness, balance

and coordination problems, and fatigue.

In addition, such cognitive changes as memory impairment, especially short-term memory, difficulty concentrating, confusion, fogginess, and such behavioral changes as anxiety, irritability and depression, as well as insomnia, are often seen in post-concussion syndrome.

Some symptoms, such as cognitive and behavioral changes and sensitivities to noise, may not develop for days or weeks after the injury occurs. The strongest and most consistent predictor of slower recovery from concussion was greater severity of a person’s acute and subacute symptoms following injury.¹

There are many causes of post-concussion syndrome symptomatology. Impact can cause structural damage to the brain or interruption of neural communication.

“Immediately after biomechanical injury to the brain, abrupt, indiscriminate release of neurotransmitters and unchecked ionic fluxes occur ... These ionic shifts lead to acute and subacute changes in cellular physiology. The resulting energy crisis is a likely mechanism for post-concussive vulnerability, making the brain less able to respond adequately to a second injury and potentially leading to longer-lasting deficits.”²

Delicate structures responsible for vision or balance can be affected. Resultant cervical dysfunction can create similar long-lasting symptoms. The interconnectedness of connective tissue and structure forms a matrix through which strain patterns can be transmitted throughout the body and the brain in all directions.

1. Iverson GL, Gardner AJ, Terry DP, et al. “Predictors of clinical recovery from concussion: a systematic review.” *British Journal of Sports Medicine*. 2017; 51:941-948

2. Christopher, C, Hovda, D. “The neurometabolic cascade of concussion,” *Journal of Athletic Training*. 2001; Vol 36(3)Jul-Sept.

Clinically, we see significant and far-reaching results regularly in the treatment of post-concussion syndrome when the rehabilitation approach includes CranioSacral Therapy.

Anatomy of the CranioSacral System

The cranosacral system consists of the meningeal membranes, including the dural membranes surrounding the brain and spinal cord, the osseous and fascial structures to which the meningeal membranes attach, the non-osseous connective tissue structures which are intimately related to the meningeal membranes, the cerebrospinal fluid, the ventricles and all the structures related to the production and resorption of the cerebrospinal fluid, the meninges and the cranosacral system glia cells.

The brain and spinal cord are covered and protected by layers of tissue called the meninges. The anatomy of the cranosacral system includes the cranial vault, which is lined with the two-layered dura mater, an endosteal layer firmly attached to the inner surface of the skull and an inner meningeal layer.

In some areas, the dural meningeal layer reflects inward and forms partitions, creating the quadrilateral space that houses the brain. The dural tissue, or membrane, forms a vertical partition that separates and contains the left and right hemispheres of the cerebrum (*falx cerebri*) and the cerebellum (*falx cerebelli*). The dura that forms the posterior horizontal partition (*tentorium cerebelli*) acts as a mezzanine floor of sorts, with the occipital and temporal lobes above and the cerebellum below.

“The falx sits like a mohawk hairstyle between the brain’s two halves and

is stiffer than the rest of the brain, like leather versus gelatin. Watching reproductions of the recorded impacts and additional simulations, the researchers saw that hits to the side of the head could produce vibrations in the falx, due to its stiffness. Those could then propagate down to the corpus callosum, creating the kind of tissue strain that is often implicated in concussion.”³ The authors went on to further describe C-shape waves produced in the falx by simulated strikes that moved the head toward the shoulder and S-waves from those that caused the head to turn. CranioSacral Therapy approaches this kind of membranous strain gently and effectively.

The second layer of the meninges is the arachnoid layer, which follows and attaches directly to the dural layer. The innermost meningeal layer, the pia mater, follows the brain contours like shrink wrap. With firm attachments at the foramen magnum and at C2 and C3 segments of the cervical spine, the dural tissue continues caudally to form a tube that surrounds the spinal cord, tethered only by ligaments, until anchoring at the second sacral segment, exiting out of the sacral canal and blending with the periosteum of the coccyx. The dura mater accompanies the spinal nerves as they exit the intervertebral foramina, forming dural sleeves that attach on the vertebral bodies.

The cushioning cerebral spinal fluid is located between the arachnoid and pia mater in the sub-arachnoid space. The cerebral spinal fluid surrounds, protects,

nourishes and cleanses the brain and spinal cord. It flows within the dural system, around and throughout the brain, where the flow is regulated by glial cells, around the spinal cord to the dural sleeves, and it is affected by dural tension.

The deepest layer of the meninges, the pia mater, is firmly connected to the dura mater of the cranosacral system via the arachnoid layer. The innermost surface of the pia mater also has a direct connection to the brain itself. It directly adheres to the brain’s matrix of glial cells via glial end-feet that form a membrane layer, called the outer glial limiting membrane. These direct and significant connections provide a plausible mechanism by which trauma to boney structures lined with dura, as well as connective tissue strain from throughout the body, can be communicated deep into the glial matrix that makes up the brain and supports its vulnerable structures.

Treatment of Post-Concussion Syndrome

Typically, management of post-concussion syndrome involves symptomatic treatment. Medication, physical therapy, and vestibular and vision therapy are traditionally used to diminish complaints and restore function.

However, clinically, we see significant and far-reaching results regularly in the treatment of post-concussion syndrome when the rehabilitation approach includes CranioSacral Therapy. In addition to being an effective treatment approach

3. Stanford University. “Role of a deep brain structure in concussion,” *ScienceDaily*. 2019; March 12). Retrieved Aug. 16, 2019, from sciencedaily.com/releases/2019/03/190312151206.htm.

for boney, connective tissue, visceral, neural and meningeal stress, CranioSacral Therapy can enhance standard therapies by calming the sympathetic nervous system, allowing other therapies to be better tolerated.

CranioSacral Therapy mobilizes sutural restrictions and effects changes in mobility of structures that are within or influenced by the cranosacral system, as well as the important dural tissues that connect to them. It facilitates the correction of boney and connective tissue dysfunction and strain, and improves cerebral spinal fluid flow.

It does so by using light-touch mobilization techniques that require a high degree of palpatory specificity and sensitivity. As a result, CranioSacral Therapy effectively treats strain patterns in the connective tissue network of the body, brain and spinal cord, enhancing function and easing symptoms.

Myriad structures are lined with dural tissue, and thus can be considered as both an origin of symptoms and as a focus for treatment. For example, all cranial bones, the nasal bones, and the orbit of the eye are lined with dura. Cranial nerves for vision, hearing and balance, among others, travel through dural tissue or through mobile boney structures with profound connections to dura, and thus can be directly influenced by dural tension. The jugular foramen, the opening through which three important cranial nerves (vagus, spinal accessory and *glossopharyngeal*) must pass, is surrounded by a ring of dural tissue.

CN X, the vagus nerve, is a primary parasympathetic nerve. Relieving dural strain can improve its function and be important in restoring the autonomic flexibility so often compromised after concussion.

The myodural bridge consists of deep suboccipital muscles that provide direct connection of C1 to dura. The eyeball itself has a dural investment directly attached to its sclera. The optic nerves, responsible for vision, are ensheathed

in all three meningeal layers, and the olfactory nerves, responsible for smell, are ensheathed by the pia mater layer. The three motor nerves for the eye must traverse the tentorium cerebelli and are directly affected by abnormal tension in this tissue layer, creating visual issues like eye teaming and tracking difficulty. These are just a few specific examples.

Because of the anatomical attachments and the continuity of fascia, CranioSacral Therapy treatment of involved structures can produce far-reaching effects, which we have seen clinically and in our research.

Two studies were conducted in 2014 and 2015 with ex-NFL football players with diagnosis of post-concussion syndrome, to determine if specific manual therapy techniques could provide an intervention that would diminish long-term symptoms in professional athletes with histories of concussion.

Upledger CranioSacral Therapy, along with Jean-Pierre Barral, DO, MRO(F), RPT's Visceral Manipulation and neuromeningeal techniques, applied to these patients with post-concussion syndrome provided significant results in their concussion recovery. Statistically significant, positive changes in cervical range of motion, memory, physical reaction time, quality of life, headache, pain levels and sleep were documented up to three months after the intervention.⁴

The Missing Piece

These initial outcomes were inspiring and showed real promise for viable treatment options for traumatic brain injury, concussion, and the secondary compensatory dysfunctions that occur following traumatic brain injury.

Changes in the continuity of fascia, restrictions in mobility of cranial structures, sutural restrictions, and extensive dural connections (meninges attached to bone, neural and visual structures and to the glial matrix of the brain) provide a mechanism whereby trauma can be communicated. CranioSacral Therapy addresses these

structures and dysfunction directly, providing a mechanism whereby correction of such strain patterns is possible, facilitating reduction in symptoms, a greater functional ease and enhanced quality of life.

According to a statement from the Concussion Alliance, "Craniosacral Therapy [is] ... one of the most effective treatments that we've found for persistent post-concussion symptoms."

CranioSacral Therapy is an important tool in the evaluation and treatment of the structural, vascular and neurologic tissue changes in concussion and post-concussion syndrome that occur throughout the body, brain and spinal cord. It is not a substitute for traditional therapies and re-education; it is the piece that is missing. **M**

Mentored by John Upledger, DOO, OMM, Melinda Roland, MPT, LAc, OMD, Dipl-Ac, CST-D, has taught CranioSacral Therapy internationally since 1988. She has been lead therapist and research director in the Upledger Institute International concussion programs. Her husband's traumatic brain injury in 1999 significantly impacted her family. He credits his improbable return to his profession as an orthopedic surgeon 11 years later to his treatments with CranioSacral Therapy.

Read "Pro Football Players Testify to CranioSacral Therapy's Ability to Address Concussion and CTE" at massagemag.com/current-issue and learn what former NFL running back Ricky Williams has to say about this technique.

Read "Specialized Touch Helped This Client Avoid Surgery" to learn how orthopedic manual therapy combined with CranioSacralQigong Therapy and Neural Manipulation helped strengthen muscles, at massagemag.com/current-issue.

4. Wetzler, R, Fryer-Deitz, A. "Craniosacral therapy and visceral manipulation: a new treatment intervention for concussion recovery," *Medical Acupuncture*. 2017; vol 29, 4.