

Craniopathy and Cerebral Spinal Fluid

Craniopathy is the study of manipulative techniques which apply to the cranial vault (skull) to enhance the flow of cerebral spinal fluid within the cerebral meningeal system. There are three layers of tissue surrounding the brain. The innermost layer is called the *pia mater*. This layer provides a covering to the brain and spinal cord and is approximately 1 cell layer thick. The middle layer is called the *arachnoid mater* and is rich with blood vessels, deriving its name from its spider's-web-like appearance. The outer layer is referred to as the *dura mater* because it is a tough and durable cellular material that completely covers the brain and spinal cord, as well as the exiting spinal nerve roots. Cerebral spinal fluid is contained within this *dura* and flows around the brain and spinal cord.

Cerebral Spinal Fluid (CSF):

The innermost portion of the brain is known as the ventricular system. It is a hollow series of chambers consisting of two lateral ventricles and third and fourth ventricles. Contained within these ventricles are tufts of tissue called the choroid plexuses, which produce cerebral spinal fluid. The cerebral spinal fluid or CSF, *Liquor cerebrospinalis*, is a clear fluid that is reprod 3 to 4 times per day. It has been said that the brain and the soul swim in the cerebral spinal fluid. CSF has many functions: it serves to clean the brain, protect the brain, nourishes the brain and provides the electrolytes that allow the brain to carry out its electrical functions. It is reabsorbed into the venous system through the dural venous sinuses and tissues referred to as arachnoid granulations. It also flows into the lymphatic system along the cranial nerves and nasal sinuses. Without adequate cerebral spinal fluid flow and reproduction, the nervous system cannot function. The cerebral spinal fluid provides the proper ion balance for exchange of electrical impulses between the nerves and the surrounding fluid. Sodium, potassium, magnesium, chloride and phosphorus are the main ions contained within the cerebral spinal fluid. Without the proper balance of ions in the CSF and within the nerve cell, the electrical impulses generated by the nerves, called action potentials, cannot take place. It is suggested that the possible alterations in the ion content and the flow of the CSF may contribute various neuromuscular diseases.

Cranial Adjustments:

Throughout the years many therapies have been applied to the cranial vault in an effort to relieve pain and suffering humanity.

- Hippocrates (400 B.C.) Discussed the anatomy and physiology of head trauma and recommended "trephanning" as treatment. (Ency. Britannica 1952)
- Obstetricians in the 1600's used corkscrews and anchoring devices to pull deformities into place (ineffective and often fatal). (Swartz, Birth injuries of the Newborn 1961)

- Barber, an osteopath, Mid-1890's published earliest photographs and text of skull manipulations for "headaches and neuralgias".
- Gregory (1910) An M.D. associated with D. D. Palmer published a photograph of a woman delivering a "special adjustment that will often relieve a headache" being applied to the skull.
- Nephi Cottam (1929) a chiropractor, published his first work on "craniology" in January. Filed first US patent on cranial manipulations in 1928.
- Lake (1942) A chiropractor and naturopath, described finger techniques with the little finger inserted into the nostrils and nasal passages
- Janse et al (1947) described the first techniques using a pressurized nasal balloon to "open the nasal chambers".
- Wm. Garland Sutherland (1929) an osteopath, published his first work in September of that year.
- Dr. Major Bertrand De Jarnette was an Osteopath, Chiropractor and inventor. He was a student of Dr. Wm. Sutherland. He developed a system of spinal and cranial manipulation that corrects and prepares the body to receive the appropriate adjustment to optimize correction while minimizing unwanted reactivity and adverse reactions. He founded the Sacro-Occipital Research Society and the International Craniopathic Society. He has authored several text books on spinal, cranial, extremity and soft tissue therapeutic procedures and manipulations. His development of Sacro-Occipital Technique and Craniopathy has fostered worldwide organizations (SORSI, SOTO-Asia, SOTO-Europe, PAAC [Japan], and SOTO-Australia)

The predominant belief within the medical profession is that the cranial vault is a solid piece of bone that does not move and has no influence over the motion of cerebral spinal fluid. There is, however, a large faction within the chiropractic, osteopathic and dental communities that recognizes that the cranial bones have a degree of motion and pliability and are influenced by and have direct influence upon the flow of cerebral spinal fluid, which can directly affect the health and vitality of the individual. Throughout the 20th century, several theories were proposed to explain the flow of cerebral spinal fluid and its effect on the cranial and spinal dural system.

Traube-Hering-Mayer waves:

- Rhythmical variations in blood pressure, usually extending over several respiratory cycles, with a frequency of 6 to 10 cycles per minute. Related to variations in vasomotor tone.
- Discovered by Traube in 1865
- Confirmed by Hering in 1869
- Again observed by Mayer in 1876 (Mayer's oscillations are described as low freq., non-synchronous with ventilatory pattern.

American Academy of Osteopathy Journal 2003 Sum Vol. 13(2) Pgs.21-33

- Moskalenko et. al.

- Joint article on “Physiological Background of the Cranial Rhythmic Impulse and Primary Respiratory Mechanism”

- Credit Sutherland with the phrase “Primary Respiratory Mechanism” in the 1930’s

Farasyn, A; Vanderschuren, F.

- The Decrease of the Cranial Rhythmic Impulse during Maximal Physical Exertion: an Argument for the Hypothesis of Venomotion? Journal of Bodywork and Movement Therapies, 2001 Jan Vol. 5(1) Pgs. 56-69

- Examiners attempted to determine whether a brief physical peak effort has an influence on the CRI.

Nelson et. al JAOA 2001 MAR Vol. 101(3) Pgs. 163-73

- Cranial Rhythmic Impulse Related to the Traube-Hering –Mayer Oscillation: Comparing Laser Doppler Flowmetry and Palpation

- Compared CRI to THM/ found to be statistically concomitant

- “This opens new potential explanations for the basic theoretical concepts of the mechanism of PRM/CRI and cranial therapy”...“these phenomena can be simultaneously monitored and recorded creates new opportunity for further research...”

Shafer, J; Intn’tl Journal of Kinesiologic Medicine 1998 FAL Vol. 2 Pgs. 28-47

- Jugular Compression in the Diagnosis and Treatment of Craniosacral Lesions

- Manual compression of the jugular veins (Queckenstedt’s Man.) causes a rise in CSF pressure at the site of lumbar puncture procedures

- Hypothesized that the use of this maneuver...is an invaluable aid to craniosacral therapy

The Cranial Vault:

The human cranium or skull is composed of numerous bones that create a cavity or a cavern that encases the brain. The bones of the cranial vault include the frontal bone, two lacrimal bones, the sphenoid, occiput, two temporal bones, two parietal bones, and the ethmoid bone. The *dura mater* encases the inside of the cranial vault and separates the brain into compartments. Right and left cerebral hemispheres of the brain are separated by a central membrane called the falx cerebri. The upper brain (cerebral hemispheres) and temporal lobes of the lower brain are separated by a membrane called the tentorium cerebelli, which means tent. The cerebellum, located at the base of the brain is divided into two parts by the falx cerebelli. These membranes help to direct the flow of CSF around the brain and provide the venous drainage, which removes blood and cerebral spinal fluid from the cranium. The

cranial bones are joined together by a variety of articulations called sutures. These interlocking and overlapping joints hold the cranium together. The *dura mater* within the cranium extends through the sutures to become continuous with the outer layer of the skull known as the periosteum.

The Facial Bones:

The facial bones do not comprise the cranial vault, but are attached to the cranial vault via sutural articulations. The bones of the face are the maxillary bones, the palatine bones, the nasal bones, the vomer, the zygomatic bones and the mandible. The maxilla and the mandible have a great deal of influence on the motion and stability of the cranial vault. The upper and lower teeth are embedded in the mandible and maxilla by peg-like articulations called gomphoses. The motion of the mandible during chewing, talking, yawning and breathing can have a beneficial effect or deforming affect on the cranial vault for a number of reasons. When normally aligned to the maxilla. The mandible helps to exercise and stimulate motion of the cranial vault and flow of cerebral spinal fluid through the chewing action and the muscles of mastication, which are primarily the masseter, the temporalis, the pterygoid and the digastricus muscles. If the teeth are misaligned, deformed or missing, they can offset the bite and produce cranial vault distortion. If the jaw is traumatized, it can cause both abnormal involuntary contraction of the muscles of mastication, and asymmetrical torsion and distortion of the cranial vault.

Cranial Motion:

Cranial motion is a function of the pliability of the cranial vault influenced by the diaphragmatic motion of respiration, muscular contractions, and circulatory flow, which together affect what is referred to as the primary respiratory mechanism (PRM). A secondary influence on the flow of cerebral spinal fluid and cranial motion, which can be palpated externally, is generated by the expansion and contraction of the glial cells of the brain and is referred to as the cranial rhythmic impulse (CRI). Although very subtle, these motions can be palpated by a trained practitioner and abnormalities within the flow of cerebral spinal fluid and cranial distortions can be diagnosed through visual observation, palpation of the cranial sutural system and palpation of the cranial pulsations. Craniopathic manipulations and diagnostic procedures are designed to evaluate and correct distortions in cranial vault position and restrictions of cranial vault movement in flexion, extension, and internal and extradural rotation, which are causing deformations of the cranial membrane system and distorting the flow of cerebral spinal fluid. In the most severe cases of cranial vault deformity, the intracranial membranes can become warped and the cerebral hemispheres can become distorted within the cranial vault.

Diagnosis of Cranial Lesions:

A craniopath – a trained cranial diagnostician -- will use a number of methods to determine the type and location of cranial misalignment and the effect it is having on the intracranial membranes and the flow of

CSF. The first diagnostic evaluation is through observation of the shape of the cranium and the facial structures. By observing the face, a great deal can be determined about the integrity of the cranium. These indicators include shape and contour of the frontal bone, size and position of the eyes and orbits, symmetry or asymmetry of the cheekbones, position of the nasal septum, size of the nasal openings, angle of the nasolabial fold (the crease that extends downward from the nose around the mouth), and shape and motion of the mandible (jaw) on opening and closing. Another indicator which can be viewed by looking at the face is the shape and position of the ears. If one ear is higher than the other or closer to the skull than the other, this can be an indication of a distortion of the temporal bones of the cranium. When viewed from the posterior, the position of the occiput -- high or low -- can indicate an extension or flexion lesion in the posterior aspect of the cranial vault. When viewed from superior to inferior (from above down), elevation of the zygomatic arch or cheekbones can be determined, elevation and asymmetry of the frontal bone can be assessed, deviations of the nasal septum can be determined and palpation and observation of the motion of the mandible can demonstrate deviations and abnormalities of opening through the process of rotation and translation. Audible and palpable cracking, popping and crepitus (grinding or crunching) within the temporomandibular joint can demonstrate generative and long-standing arthritic distortions, indicating long-term cranial disrelationships. Palpation of the sutural margins can identify areas of tightness and ropiness of the tissues, indicating inflammation and pain. Palpation of the masseter and temporalis muscles can identify fibrosis and trigger point tenderness, indicating chronic spasms, which can deform the cranial vault over time.

Cranial Manipulation:

Cranial manipulative therapy by a trained doctor of craniopathy can produce significant changes in the cranial vault and the craniofacial structural relationships. A wide variety of symptomatology can be relieved when the appropriate cranial manipulative strategy is employed. The trained craniopath can make an accurate diagnosis of the cranial lesion affecting the patient's overall health, and can make the corrections indicated by his or her examination. Some manipulations of the cranium can be performed by hand contacts on the cranial vault externally, and some cranial corrections must be made intraorally by specific contacts used to facilitate restoration of optimum cranial respiratory function and flow of CSF.

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