The term dizziness is nonspecific but may refer to vertigo, lightheadedness, presyncope, disequilibrium, or other dizziness. Vertigo is a type of dizziness characterized by sensations of movement (usually spinning) felt inside a person’s head or perceived as the environment moving. Many conditions involving dizziness have overlapping symptoms; therefore, diagnosis with certainty is often difficult. Diagnoses in clinical practice are based mainly on patient history and symptoms, and patients are often vague or contradictory in describing their symptoms. Agreement as to diagnostic terminology for various dizziness disorders varies. Symptoms can be quite variable among patients and within individual patients over time, creating a diagnostic challenge.

Most of those with chronic symptoms are not relieved by medical treatment. Undetermined and ill-defined causes of vertigo such as vasovagal syncope, hyperventilation syndrome, post-traumatic vertigo, and nonspecific dizziness are the most common single “cause” of dizziness reported. Many patients for whom the diagnostic process has failed may be erroneously diagnosed with a psychiatric problem.

The lack of specific therapies for many types of dizziness has been called one of the “Achilles’ heels in our ability to confidently ascribe etiologic labels.” Likewise, establishing a cause of dizziness is most useful when it leads to a specific therapy. Calls have been made for new approaches to diagnosis, and investigation of alternative therapies for chronic and recurrent dizziness has been advocated. Patients, hospital-based physicians, and practitioners in primary care and medical subspecialties felt that they were not adequately informed about alternative treatments. Increased referral to alternative healthcare providers may require both ongoing peer-reviewed studies of efficacy and increased physician access to information concerning therapies that have undergone definitive study.

The objective of this paper is to describe dysfunction of the craniosacral system, particularly temporal bone motion asymmetry, as a cause of vertigo and to suggest a new perspective on research, diagnosis, and treatment.
DISCUSSION

The craniosacral model proposes a new way of evaluating and treating vertigo symptoms with the observation that the bones of the skull move in response to rhythmic pressure changes within the membranes surrounding the brain and spinal canal. Mobility restrictions or misalignments along the cranial sutures are said to have adverse effects on health that can be corrected through gentle manipulation of the cranial bones, sacrum, and the connecting membranes enclosing the brain and spinal cord. These structures also may be influenced through release of connective tissue tension anywhere in the body.

Proper functioning of the craniosacral system is evaluated through palpation of the craniosacral rhythm, the regular wave of fluid-pressure changes within the system, about 6 to 12 cycles per minute. The production phase of the cycle is termed “flexion” or filling cycle. The resorption phase is termed “extension” or draining cycle.

The craniosacral rhythm is transmitted to the sacrum via the dural tube and throughout the entire body via osseous connections, dural spinal sleeves, and the motor division of the nervous system. During flexion, the entire body externally rotates slightly; during extension, the body internally rotates. The craniosacral rhythm, therefore, may be palpated anywhere in the body. Restrictions in the body fascia can result from a variety of internal and external causes. These restrictions cause interruptions of the craniosacral rhythm, thereby revealing the location of the problem. The entire system constitutes a delicate and subtle pattern of energy ebb and flow that is responsive to gentle touch but resists heavy or intrusive touch.

Temporal Bone Motion and Dural Attachments

The 2 adherent layers of the dural membrane within the cranial separate to form a horizontal leaf (the tentorium cerebelli) and a vertical leaf (the falx cerebi), thus dividing the brain into quadrants. When the system is filling during flexion, the skull widens and shortens. When the system is draining during extension, the skull narrows and lengthens.

The temporal bones are connected bilaterally along a roughly horizontal plane by attachments of the tentorium cerebelli. They move in tandem about diagonal axes roughly along the lines of the auditory canals. During flexion (Figure 1) the squamous portion of the temporal bones arc forward and lateral, increasing the distance between them. At the same time, the zygomatic processes move inferior. The mastoid tips move posteriorly, superiorly, and closer together. This movement is known as external rotation and causes the anterior borders of the tentorium cerebelli to move slightly anterior. The effect is to tighten the membrane, which acts as a diaphragm influencing the fluctuation of cerebrospinal fluid. During extension, cerebrospinal fluid-pressure decreases and the movements of the temporal bones reverse along the same axes. Thus, the general movement of the paired bones is forward and backward in an arc. But because the axis of rotation is along a diagonal axis, they also move inward and outward, something like a casement window swinging externally above and internally below its horizontal axis. This complex motion has frequently been compared to a wheel wobbling around a bent axle.

**Dysfunctional Temporal Bone Movement**

Impediments to normal temporal bone motion can occur anywhere along the arc of its normal motion. These impediments could stop motion completely at a certain point, disallowing...
Temporal Bone Misalignment and Vertigo

Temporal Bone Misalignment and Vertigo

Supporting Evidence

In the 1930s, osteopathic physician William Garner Sutherland, DO, observed that the spheno-temporal suture was beveled liked the gills of a fish and appeared to be designed for movement. 

Skulls with patent sutures have been described as complexes of independent units or functional components rather than isolated single structures. 

Slight movement has been measured between the cranial sutures. The cranial sutures are innervated and highly vascularized but are not rigidly fused. Mechanical restriction of cranial bone movement causes measurable physiological responses, which abate when constriction is removed. 

Cranial bones of rats transplanted to a new location changed the morphology of the suture (eg, butt-end to beveled overlapping) consistent with the functional demand of the new location for growth and movement. There is evidence that sutures are patent throughout life. 

Dural membranes can elongate upon application of traction of the cranial bones on an embalmed cadaver. Dissection studies of fresh cadavers suggest that the dural membranes are capable of manipulation with light traction via osseous "handles." Changes in cranial bone positions after cranial manipulation were measured in degrees using x-rays (Dental Orthogonal Radiographic Analysis). Degree of change of the atlas, mastoid, zygomatic, sphenoid, and temporal ranged from 0° to 8°. The average degree of change for the mastoid was 1.66 (range 0-6). The average degree of change for the temporal was 1.75 (range 0-5). Measurements of strain on the skull using laser holography show strain patterns with as little as the weight of a penny. Distinct swirling patterns appear upon compression of the temporal bones with a pair of tongs. This pattern is consistent with reported palpated motion of the temporal bones classically described as a wobbly wheel.

Sources of Craniosacral Restriction

Clinical experience suggests that spinning vertigo, in contrast to the more vague complaints of dizziness and unease, is more likely to occur the more diametrically opposed the temporal bones move in relation to one another (Figure 2). Hearing loss, nausea, vomiting, and/or other autonomic symptoms with or without vertigo are more likely to occur when one or both temporal bones are compressed or moving sluggishly. Because the temporal bones have articulations with the sphenoid, occiput, parietals, and zygoma, misalignment of any of these bones could affect the entire cranium, causing any number of nerve entrapment pathologies, vascular occlusion, and interference with lymphatic channels.

This author has seen a patient who, in a single session, was completely relieved of episodic vertigo and hearing loss, tinnitus, and aural pressure along with nausea, pain in the left cheek, excess saliva, difficulty swallowing, and a bitter taste in the mouth by a craniosacral release of a compression at the left jugular foramen. Table 1 lists the nerves and blood vessels passing through the temporal bone, suggesting possible causes for these symptoms if the temporal bones are compressed or misaligned.

Temporal bone problems may result directly from osseous impaction or from dural tension on the bones that can be transmitted from anywhere in the body. The intracranial dural membranes are connected with the cervical fascia and so with much of the rest of the body. For example, there is a direct continuity of fascia from the apex of the diaphragm to the base of the skull extending to the outer surface of the sphenoid, occipital, and temporal foramina. The fascia continues through the foramina at the
Temporal Bone Misalignment and Vertigo

The exact pathway to dural membrane tension and temporal bone restriction may vary considerably. Common restrictions include direct osseous impaction at the temporoparietal suture or tension on muscles crossing the suture, thoracic inlet tension, respiratory diaphragm tension, strain on the sphenoid, and compression of the occipital condyles into the transverse process of the atlas.

Other restrictions found by this author to cause asymmetric temporal bone movement include a restriction of the hyoid bone with tight muscle connections to the mastoid process; compression of the vomer into the rostrum of the sphenoid; dural twisting at the thoracic-lumbar area transmitted into the tentorial membrane, producing a rhythmic torsion and side bending of the temporal bones; pyloric spasms apparently due to anxiety, which pulled the temporal bones out of sync; and a radical hysterectomy transmitting pelvic diaphragm tension into the cranium.

The value of craniosacral therapy is that it can identify seemingly esoteric and unsuspected structural abnormalities that can lead to vertigo with no apparent cause under traditional diagnostic techniques. It is usually easy for a skilled therapist to locate and release structural restrictions in the body once asymmetrical temporal motion has been found. Upledger once relieved a case of vertigo by tracing the cause of a jammed left temporal bone from an old knee and ankle injury through the pelvis and spine and into the cranium. 41

Since connective tissue restrictions from various places in the body can be transmitted into the dural tube, external or internal stressors can cause variable tension on the dura, locally or from a distance. Once a critical structural imbalance has been created, any one of these stressors (such as venous pressure changes, muscle tension, organic dysfunction, menstruation, allergies, or emotional disturbance) may trigger acute symptoms.

**TABLE 1** Nerves and Blood Vessels Running Through the Temporal Bones

<table>
<thead>
<tr>
<th>Nerves and Blood Vessels Running Through the Temporal Bones</th>
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<tbody>
<tr>
<td>Acoustic Internal carotid artery</td>
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<tr>
<td>Chorda tympani Stylomastoid artery</td>
</tr>
<tr>
<td>Facial (C.N. VII) Internal jugular vein</td>
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<tr>
<td>Greater petrosal Occipital artery</td>
</tr>
<tr>
<td>Sympathetic plexus of internal carotid Inferior petrosal sinus</td>
</tr>
<tr>
<td>Semilunar ganglion of trigeminal (C.N. V) Middle meningeal vessels</td>
</tr>
<tr>
<td>Tympanic branch of glossopharyngeal (C.N. IX) Typanic branch of maxillary artery</td>
</tr>
<tr>
<td>Auricular branch of vagus (C.N. X) Internal auditory branch of basilar artery</td>
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<tr>
<td>Stylomastoid artery</td>
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<tr>
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<td>Internal auditory branch of basilar artery</td>
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<tr>
<td>Internal cochlear branches of jugular</td>
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**CONCLUSION**

Clinical experience suggests that craniosacral therapy is a powerful evaluative and treatment modality for vertigo patients who have not found relief from medical treatments. A narrative review of literature describes and supports a theoretical link between dysfunction of the craniosacral system and vertigo. Dysfunction of the craniosacral system may include osseous, dural membrane, and fascial restrictions leading to asymmetric temporal bone movement and hence vertigo. Clinical trials are necessary not only to verify that craniosacral therapy is an effective treatment but also to determine the full range of symptoms and medical diagnoses for which craniosacral therapy is beneficial. These studies ought to be performed at vestibular rehabilitation or hearing and balance centers that see large numbers of patients with a variety of symptoms and established medical diagnoses. Initially, all patients with any kind of non–life-threatening dizziness or vertigo should be tested for temporal bone asymmetry. Non-specific dizziness and vertigo, post-traumatic vertigo, positional vertigo, recurrent benign vestibulopathy, migraine vertigo, and Ménière's disease are among the diagnoses that could be evaluated for temporal bone misalignment. Results of craniosacral therapy on appropriate patients could then be evaluated and tested against standard rehabilitation techniques and controls.

Care must be taken in selecting a craniosacral therapist who has the sufficient level of skill to accurately assess and treat temporal bone misalignment, including the ability to palpate dural membrane and fascial restrictions, which may affect the temporal bones from anywhere in the body. The presence of temporal bone motion asymmetry provides a specific structural marker that is both predictive of vertigo and indicative of a positive prognosis; therefore, craniosacral therapy could reduce the amount of laboratory testing, neuroimaging, and other low-yield tests without adversely affecting patient outcome. Because of its efficiency in skilled hands, craniosacral therapy has the potential to greatly reduce the amount of time, money, and misery that vertigo often involves, at least among this class of identifiable patients.
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REFERENCES