

Craniosacral osteopathy revisited

Part I The critique

In the eyes of conventional osteopathic and medical circles, craniosacral osteopathy (CSO) is considered, generally, as a delusion or a new form of healing¹. Its increasing popularity and exposure will lead to more critical reviews from physicians and 'rationalistic' circles. This criticism is exacerbated by cranial practitioner's tendency to present their work as a 'mystical' and nearly 'magical' experience. The later writings of Sutherland, the writings of some of his students often contain descriptions and phrases which do not seem to relate to any known physical forces. They seem to suggest that this technique touches the very essence of the principle of Life. The clinical results of CSO, as far as we know, do not vindicate this 'magic'. Traditional cranial does not cure cancer, liver cirrhosis or psychiatric cases, i.e., it fails and succeeds where standard osteopathy fails and succeeds. In other words, CSO is just another way - possibly softer, possibly more effective, but not different in its essence - of achieving the same goals. If so, if craniosacral is a 'normal' therapy – i.e., obtains 'normal' results – it should be discussed in normal anatomical and physiological terms.

A cranial osteopath myself, I wish to engage, here, into a thorough but constructive criticism of CSO. This therapy raises many questions that may be found, scattered, in the osteopathic and medical literature. Are skull sutures still mobile in the adult age? What is the CRI? Of what nature is the connection between the sacrum and the skull? How do cranial practitioners justify their claim that they can treat most conditions – digestive problems, low back pain etc – from the head or the sacrum? How can a micrometric motion between skull bones influence the mobility of the lung or gut?

The tenets of craniosacral

¹ Cranial osteopathy, delusion or reality? Ferré JC *et al.* Actual Odonstomatol (Paris) 1990 Sep 44:171 481-494

Before we deal with these – and other - questions, a review of the basic beliefs of craniosacral osteopathy is necessary. They can be summarized through the following points.

1. [An *objective, regular*, independent, pumping mechanism exists within the skull and vertebral canal. Its power seems to be centered in the cranium. This mechanism causes a periodical rise and fall of cerebrospinal (CSF) fluid pressure. Through the meninges, the pressure wave *instantly* spreads from the cranium to the sacrum. As it spreads downwards, CSF continuously escapes from the spinal canal/cranial foramina, reaching all tissues. This CSF-driven motion can be felt, *synchronously*, over all parts of the body.

2. [The above-mentioned rise and fall of intracranial pressure is accommodated at all cranial sutures, which remain ‘mobile’ throughout life. Mechanical or other trauma can cause ‘lesions’ in these articulations. These ‘sutural lesions’ can lead to many pathological conditions, from sinusitis, locally, to more distant, orthopedic, psychiatric or visceral disorder.]

3. [Trained osteopaths can feel the rhythm – known as the CRI² or Primary Respiratory Mechanism - at a frequency of about 8 to 12 cycles per minute. Other, slower, rhythms have been described (1 to 2 cycles per minute)³.

4. [This continuous rhythm makes typical pauses called “still points”. These *still points* have a therapeutic value and can be provoked by the cranial osteopath].

4. [Cranial osteopaths claim they can locate, with their hands, areas of hypomobility at the various cranial sutures. They have developed numerous techniques that can restore freedom of motion. Articular freedom can also be obtained by “directing” the CSF to the restricted area, from anywhere in the body. Once mobility is restored, the osteopath can expect a clinical improvement, whether local, distant or systemic.]⁴

4. [Cranial osteopaths have offered various physiological models to explain this rhythm. Quoting the observations of Lumsden, H. Magoun DO proposed that the periodic contraction of astrocytes is responsible for the pumping of the CSF within the cranium, and, from there, to the periphery. Magoun, after Sutherland, also evoked an electro-magnetic phenomenon⁵ Upledger formulated a model where the rises and fall of CSF pressure are due to a rhythmic secretion of this liquid at the choroid plexuses⁶.

² Cranial rhythmical impulse

³ See the writings of Rollin Becker, and his student, Jim Jealous.

⁴ This is a personal summary. It omits, obviously, many details.

⁵ H. Magoun, *Osteopathy in the cranial field.*

⁶ This periodicity is due to a complex feedback loop where pressure and tension receptors control the secretion of the choroid plexuses. This model is presented in the various works of John Upledger.

A review of beliefs

This *credo* raises several questions, which I propose to review.

The CRI is considered as *objective*, meaning that this rhythm ‘beats’ in the patient, whether an osteopath has his hands on or not. Furthermore, it is considered as *synchronous*, i.e., three osteopaths, one on the feet, the other on the sacrum and a third on the cranium, should perceive its various phases in synchrony. The teaching of craniosacral is largely based on this assumption. For instance, teachers of CSO tell their students when to feel the various phases of the rhythms.

CSO has a simple physical explanation as to why two or more practitioners, who lay their hands on the same patient, can feel the CRI *synchronously*. Sutherland believed that the rhythm is due to periodic rises and falls of CSF pressure, ‘fluctuations’ in his own terms, ‘tides’ for his modern successors. These fluctuations are supposed to be an *objective* phenomenon, not due to the imagination of the operator, and, as such, trained individuals will feel it and *agree* upon it.

As a long-time practitioner and teacher of CSO, I must underline the importance of these questions. These beliefs totally condition the quality, the pedagogy and the credibility of craniosacral osteopathy.

We can retain, from the above, that cranial osteopathy was originally founded on the following postulates:

- The CRI is powered from within the skull/sacrum axis
- The CRI reaches the periphery without any delay or loss of amplitude.

With no need for any further enquiry, simple logic precludes the *simultaneous* validity of these two postulates. Indeed, basic physiology of the cardiovascular system, the major fluid pump of the body, forbids such a model. The heart rhythmically ejects blood through large and small vessels. Despite its size and strength, it takes a certain delay for the cardiac pulse wave to reach the periphery. Not only is there a delay but also a considerable loss of amplitude between the aortic valve and, for instance, the radial or dorsalis pedis arteries. The CRI is, supposedly, another central pulse wave. To claim that any pulse wave can reach the periphery without any delay or loss of amplitude is a physiological impossibility. Detailed studies have shown the rate of secretion and absorption of CSF along its various routes. In the rat, for instance, particles injected in the skull cavity take *hours* to reach the *cervical* lymph nodes, let alone the feet. It is an accepted physiological fact that CSF escapes from the cavities of the CNS, a fact evoked, in many cranial osteopathic writings, as a ‘proof’ of the model. Cranial osteopaths, themselves, admit that it is very difficult to feel the rhythm at the cranium, owing to the weakness of the pressures involved. Much training is needed to detect it along the cranio-sacral axis, i.e., where, supposedly, it is strongest. Knowing, from physiology, that this very weak

pressure should become infinitely weaker by the time it reaches the feet, one wonders about the talents needed to feel it at the periphery. The time delay between the cranium and the feet would, furthermore, imply hours of waiting for any given phase of the rhythm.

Pascal's law

The model of cranial would work if the body was a closed hydraulic system. Pascal's law would then operate⁷, i.e., a rise of pressure at any point, would be, instantly and equally, reflected at all other points. We know, however, that this is not the case. Pressure rises occur constantly in the body and are systematically buffered by escape routes, dead spaces, venous compliance etc. Craniosacral osteopaths who feel a synchronous swelling, of equal amplitude, at the head and at the feet, cannot, logically, attribute this perception to CSF pressure waves. In other words, even if a "CRI-like motion" was proven to exist, its rises and falls *would have to be felt* at different amplitudes and timings at the head, the hands and the feet.

One could always argue that, although the CRI is a subjective experience, thousands of osteopaths seem to agree between themselves that they can feel it reach the hands and feet at the same time. As the saying goes, one may suspect "objectivity" when several "subjectivities" agree. Four recent studies have completely invalidated this assumption^{8,9,10}. They have shown that there is no inter-reliability between several operators laying their hands on a single patient. There is no significant correlation between the phases felt by each one, on different body areas. Moreover, the average measured frequency was much slower than the usual 10 c/mn. These studies confirm what simple logic taught us: there seems to be no such a thing as a synchronized CRI. In other words, even if we admit that craniosacral osteopaths feel 'something' real, this 'something' cannot be a synchronized rhythm powered from the CNS. We shall return on that essential point below.

The destiny of the CSF

The subject of CSF secretion, absorption and pressure has considerably preoccupied the craniosacral profession. Indeed, we periodically hear or read about "someone" who has – at last - succeeded in measuring the CRI with some mechanical contraption on the skull, or about some surgeon who "saw it" with his own eyes or, some cineradiographic study demonstrating the existence of this pulsation. These are, generally, anecdotal reports, and they stand in stark contrast

⁷ Pascal's law predicts that, within a closed hydraulic system, any increase in pressure at any point will be equally reflected at all other points. Had the body been such a closed system, the secretion of one milliliter of CSF at the brain would have been reflected immediately at the feet, just as the standard CSO model predicts. As closed hydraulic systems, however, we would have been dead long before the first milliliter reached the feet and certainly incapable of talking about CSO.

⁸ Hanten WP et al, J. Orthop Sports Phys Ther 1998 Mar **27:3** 213-8

⁹ Wirth-Patullio et al, Phys Ther 1994 Oct **74:10** 908-16

¹⁰ Rogers JS et al, Phys Ther 1998 Nov **78:11** 1175-1185

with the enormous medical literature on the subject. Indeed, owing to the sensitivity of the brain to any kind of pressure, CSF physics has been intensively studied at the fundamental and clinical level. Indeed, uncontrolled and sustained rises in CSF pressure can literally destroy the very fragile substance of the brain or spinal cord. Even the mild CSF pulsations due to heart systole can be potentially deleterious¹¹. Accordingly, over the last years, neurophysiologists or physicians have tried to elucidate the various mechanisms that buffer such rises. They have used every possible mean: direct manometry, plethysmography, ultrasound, NMR, metabolic rates etc. Every recess of the cranial box, every compartment of the vertebral canal have been explored. Pressure variations have been measured to the tenth harmonic. Variations distal and proximal to complete or partial obstructions have been measured with extreme precision. A complete obstruction of the aqueduct of Sylvius, for instance, does not cause any instant rise in CSF pressure in the lateral and IIIrd ventricles¹². Barring major pathologies such as hemorrhages or an acute thrombosis of the sagittal sinus, CSF pressure rises are buffered instantly.

Besides the notion of ‘CSF fluctuation’, Sutherland believed in a ‘contractility’ of the brain and spinal cord substance. Ever since, CSO has taught that the CNS matter ‘moves’, rhythmically, in synchrony with the ‘fluctuations’ of the CSF. Again, the rumor goes that some distant NMR study did objectivize this brain motion. The medical literature does not vindicate the existence of this mobility. Very detailed studies, again using every known instrument, have measured the motions of the various parts of the CNS. Two motions are obvious. The brain, *as a whole*, moves clearly with the respiratory and cardiac pulse, and with nothing else.

Heart and breathing

How could the CRI escape all the ‘nets’ thrown, so far, in the waters of the cerebrospinal fluid? Or, possibly, does CSO deal with a paranormal phenomenon? If so, then, there is no need to look for any physiological explanation, and we should leave that therapy in peace, alongside its many sisters and brothers in the world of unknown phenomena.

The numerous recordings made of CSF circulation, so far, have shown two regular rhythms:

- The cardiac pulse. CSF pressure rises with each systole and falls with diastole. These variations of pressure have been studied to a remarkable degree of precision in all compartments of the cranio-sacral cavity. Contrary to our intuition, the flow of CSF is far from being linear, it is largely a *to and fro* motion, happening with each heart beat. This precludes

¹¹ See the postulated mechanism of syringomyelia in Heiss JD et al, J Neurosurg 1999 Oct **91**:4 553-62

¹² As opposed to John Upledger’s model, founded on the idea that the Ist, IInd IIIrd ventricles are immediately sensitive to rises in CSF pressure, i.e., from one ‘beat’ of the CRI to the other.

any direct and instantaneous transmission of pressure from the center to the periphery¹³.

- The respiratory pulse. CSF pressure *falls* with inspiration and rises with expiration. The amplitude is larger than that induced by the cardiovascular pulsation. The pressure fall with inspiration runs counter to the common CSO belief that thoracic and craniosacral inspiration (or 'flexion') occur synchronously. Moreover, cardiac systole raises the pressure, and thoracic respiration makes it fall. These are contradictory motions. In other words, the cardiac and respiratory pulse cause to and fro motions which are sometimes in parallel, sometimes contradictory, leading to a very complex motion, changing from beat to beat, respiratory cycle to another. As I mentioned above, the pressures caused by the the cardiac and respiratory pulse, fall acutely along the craniosacral cavity, the further away we measure from the cranium. No one serious would want to measure the cardiac- or respiratory-induced CSF wave at the feet¹⁴.
- Finally, a whole series of rhythms, some of a larger, some of a smaller amplitude than the above two. *These are not regular*. They will be discussed below.

In this ballet of motions, parallel and contradictory, no one ever reported about the existence of a *synchronous* and *clockwork* rhythm, as the CRI is described by CSO.

From the above, we can safely assume that, barring the existence of an unsuspected or paranormal phenomenon¹⁵, the CRI simply cannot exist as a regular, CSF-dependent phenomenon able to move the periphery.

Technical problems

The techniques used by cranial osteopathy raise other difficult questions. Everyone agrees, including CS osteopaths, that the mobility between cranial sutures is very small. How could lesions of such tiny articulations cause major pathological disturbances?¹⁶ Through which pathways are these tiny 'lesions' supposed to act? Is there any hint, in modern physiology, that micrometric lesions can cause scoliosis, asthma or digestive problems?

¹³ As in the models proposed by Magoun or Upledger.

¹⁴ One wonders also how the sacrum is supposed to react instantly to cranial meningeal pull. As noted by Ferguson (exchange of letters to the Editor, Osteopathy Today, 1999-2001), it would have to be so tight as to make any normal spinal motions impossible. On the other hand, if the feet and cranium move at the same time during the CRI, what is the specificity of the cranio-sacral synchronicity of motion? When everything moves together, no particular part of the system can be privileged.

¹⁵ Something we should always be prepared to accept, until the phenomenon is explained and becomes "normal".

¹⁶ No one ever proved that hypomobility in one of the - comparatively - huge vertebral articulations has a deleterious effect on human health, let alone in the zygomatico-frontal suture. The research of Denslow and Korr, at Kirksville are only suggestive. They are 'research models'. As yet, osteopathy has not supplied a single clinical study that vindicates its fundamental premises.

Sutherland and his followers have described the very complex mechanics of flexion, extension, external and internal rotation of bones like the sphenoid, the lachrymal or the palatines. They have ascribed it to a transmission of tension from the CSF to the bones and the meninges. But how would a simple ‘fluctuation’ of the CSF cause a complex motion of these heavy tissues?

The corrective techniques used for these tiny lesions are no less problematic.

Two of the mainstays of cranial technique are “V-spread” and “compression of the 4th ventricle” (CV4). The last technique tries to bring the CRI to a standstill – in other words, stop the ‘pump’ - by encouraging one of the two phases of the rhythm. This technique can be practiced from the feet or the head. We already underlined the problem of feeling the CSF pulse wave at the feet. We are now confronted with even a more difficult claim: the central pump, postulated to exist somewhere in the CNS, can be stopped, altogether, by a very gentle rotation of the feet. Meaning that the choroid plexuses, in the IIIrd and lateral ventricles, are sensitive to mild foot rotation.

Vspread technique is, likewise, problematic. The CS osteopath claims he can direct the ‘CSF’ from one end of the cranium to any other, or from the cranium to any other part of the body. How does one create such highly specific ‘currents’ within the skull or the body?

In addition to the above techniques, craniosacral osteopaths – including the present author - use manipulations called “unwinding” or “myofascial release”, where the operator lays his hands quietly on the patient and *listens* to the spontaneous expression and resolution of tissue tensions. The operator feels the tissues literally ‘twist’ under his hands. How can the simple rise and fall of CSF – or any other fluid - explain these highly convoluted motions? Fluids can only cause a periodic swelling and shrinking, no torsion or twists.

The points raised above indicate that the classical, CSF-centered, model of the primary respiratory mechanism is, at best, illogical. Whether the choroid plexuses, the astrocytes or any other anatomical entity cause the CRI is completely immaterial. The physiological and clinical effects of craniosacral cannot be explained *by any model* exclusively centered in the craniospinal cavity.

Is craniosacral osteopathy a hoax? Is it built on a sandcastle?

As a practitioner of this technique for many years, I believe that this is not the case. I have approached this question¹⁷ from a historical point of view, trying to show that ‘cranial’ is an obligatory expression of the osteopathy founded by Still.

¹⁷ See article called ‘One hundred year war’ on the site www.connective.org

The founder invented a therapy that included, simultaneously, 'cranial' and 'structural'. His followers separated into the two branches we call with these names.

From a fundamental and clinical point of view, the modern medical literature contains enough information to justify, right down to the details, what Still, Sutherland and their students believed and practiced. We just need to change the 'model' through which we read their claims. This will be the subject of the next article.