Summary of Research Findings for Osteopathic Treatment in the Cranial Field: An Annotated Bibliography

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Please note: This summary was undertaken by clinicians. It attempts to be illustrative rather than an exhaustive literature review (although some of those are referenced in this paper). It has not included:

- some of the more recent work relating palpatory findings and clinical changes to quantum phenomena, because that area is beyond the technical expertise of the authors;
- single case studies (of which there are a number in the literature); nor
- much of the older work done by researchers such as Sutherland, Magoun and Frymann, because we did not have access to the full text of their work at the time of writing.

Version 1.1

It has been understood by anatomists for many years that there is movement at cranial sutures

The Structure and Development of Cranial and Facial Sutures[1]

"The histology of the suture suggests that it has two main functions, viz. that it is a site of active bone growth, and that it is at the same time a firm bond of union between the neighbouring bones, which nevertheless allows a litle movement.
That sutures have this dual function has been expressly stated by Bernstein (1933), Giblin & Alley (1944), Massler & Schour (1951), Moss (1954), Baer (1954), and Scott (1954)."
"Considered as articulations, the sutures possess the means for resisting gross separation of the bones, while at the same time permitting slight relative movement."
"The central zone, however, with its weak fibre bundles running in all directions and its sinusoidal blood vessels, could well allow some slight movement of one bone against the other, and so could be regarded as analogous to a synovial joint cavity."

Detection of skull expansion with increased intracranial pressure.[2]

"A technique is described which uses standard strain-gauge technology to detect skull expansion associated with increased intracranial pressure."

Role of cranial bone mobility in cranial compliance.[3]

"Data reported here indicate that the movement of the cranial bones at their sutures is an additional factor defining total cranial compliance. Using controlled bolus injections of artificial cerebrospinal fluid into a lateral cerebral ventricle in anesthetized cats and a newly developed instrument to quantify cranial bone movement at the midline sagittal suture where the bilateral parietal bones meet, we show that these cranial bones move in association with increases in ICV along with corresponding peak intracranial pressures and changes in intracranial pressure. External restraints to the head restrict these movements and reduce the compliance characteristics of the cranium. We propose that total cranial compliance depends on the mobility of intracranial fluid volumes of blood and cerebrospinal fluid when there is an increase in ICV, but it also varies as a function of cranial compliance attributable to the movement of the cranial bones at their sutures."

Radiographic evidence of cranial bone mobility.[4]

"Twelve adult patient charts were randomly selected to include patients who had received cranial vault manipulation treatment with a pre- and post-treatment x-ray taken with the head in a fixed positioning device. The degree of change in angle between various specified cranial landmarks as visualized on x-ray was measured. The mean angle of change measured at the atlas was 2.58 degrees, at the mastoid was 1.66 degrees, at the malar line was 1.25 degrees, at the sphenoid was 2.42 degrees, and at the temporal line was 1.75 degrees. 91.6% of patients exhibited differences in measurement at 3 or more sites."

Cranial sutures are intimately related to dysfunctions and strain patterns throughout the skull and brain

The pathogenesis of premature cranial synostosis in man.[5]

> "Instead of directing our attention exclusively to the affected sutural area, we may consider the resulting neurocranial malformation as an expression of some lack of coordination with the functional unity of the inter-related neurocranial components."
> "It is maintained that premature sutural synostosis is a symptom and not a cause, and that the changes in neurocranial sutural synostosis are easily understood in terms of the the growing, functionally related cephalic components."

Phenotypic integration of neurocranium and brain.[6]

> "Our comparative analysis of phenotypic integration of brain and skull in premature closure of the sagittal and the right coronal sutures demonstrates that brain and skull are strongly integrated."

Pulsatile movement of the cerebro-spinal fluid and the brain itself can be measured, and there are flow patterns within the CSF. Multiple drivers of these movements have been identified, and these operate at different frequencies.

Human brain motion and cerebrospinal fluid circulation demonstrated with MR velocity imaging.[7]

> "In this study, in vivo, quantitative magnetic resonance (MR) imaging methods were developed to show reproducible magnitudes and directions of CSF flow."
> "Observations of pulsatile brain motion, ejection of CSF out of the cerebral ventricles, and simultaneous reversal of CSF flow direction in the basal cisterns toward the spinal canal, taken together, suggest that a vascular-driven movement of the entire brain may be directly pumping the CSF circulation. The authors describe what they believe to be the first observations and measurements of human brain motion, which occurs in extensive internal regions (particularly the diencephalon and brain stem) and is synchronous with cardiac systole."

Pulsatile brain movement and associated hydrodynamics studied by magnetic resonance phase imaging. The Monro-Kellie doctrine revisited.[8]

> "The resultant movement occurred in a funnel-shaped fashion as if the brain were pulled by the spinal cord. This may be explained by venting of brain and cerebrospinal fluid (CSF) through the tentorial notch and foramen magnum. The intracranial volume is assumed to be always constant by the Monro-Kellie doctrine. The intracranial dynamics can be viewed as an interplay between the spatial requirements of four main components: arterial blood, capillary blood (brain volume), venous blood and CSF. "
> "The arterial expansion causes a re-moulding of the brain that enables its piston-like action. The arterial expansion creates the prerequisites for the expansion of the brain by venting CSF to the spinal canal. The expansion of the brain is, in turn, responsible for compression of the ventricular system and hence for the intraventricular flow of CSF."

Oscillatory motion of the normal cervical spinal cord.[9]

> "The cervical spinal cord moves with an oscillatory pattern in the craniocaudal direction."

Noninvasive measurement of pulsatile intracranial pressure using ultrasound.[10]

> "The technique is based upon detecting skull movements which are known to occur in conjunction with altered intracranial pressure."
> "Frequency analyses (fast Fourier transformation) clearly demonstrate the correspondence between the pulsed phase locked loop output and intra-cranial pressure pulse cycles."

Slow oscillations of cytochrome oxidase redox state and blood volume in unanesthetized cat and rabbit cortex. Interhemispheric synchrony.[11]

> "Continuous oscillations of CYT [cytochrome oxidase redox state] and CBV [cranial blood volume], unrelated to pulse or respiration, were always observed in each animal. Frequency (FFT) analysis over time revealed a nonstationary distribution of frequencies below 0.4 Hz, with most of the spectral power being contained in the 0-0.25 Hz band during both waking and sleep. Although the time-frequency plots of the CYT and CBV signals were similar, an occasional dissociation between the CYT and CBV oscillations was found. Analysis of simultaneous bilateral cortical optical recordings revealed a significant and sustained interhemispheric cross-correlation over time between the CYT as well as the CBV oscillations during stable recordings as long as 60 min. We conclude that: 1) CYT and CBV levels normally oscillate at < 0.4 Hz in the unanesthetized cat and rabbit cortex; 2) these complex oscillations, whose frequencies are non-stationary over time, nevertheless show sustained interhemispheric synchrony between 50 mm2 homotopic cortical regions; and 3) these oscillations may in part represent fluctuations of the metabolic rate."

Cranial rhythmic impulse related to the Traube-Hering-Mayer oscillation: comparing laser-Doppler flowmetry and palpation.[12]

> "The primary respiratory mechanism (PRM) as manifested by the cranial rhythmic impulse (CRI), a fundamental concept to cranial osteopathy, and the Traube-Hering-Mayer (THM) oscillation bear a striking resemblance to one another. Because of this, the authors developed a protocol to simultaneously measure both phenomena. Statistical comparisons demonstrated that the CRI is palpably concomitant with the low-frequency fluctuations of the THM oscillation as measured with the Transonic Systems BLF 21 Perfusion Monitor laser-Doppler flowmeter."

Cranial diameter pulsations measured by non-invasive ultrasound decrease with tilt.[13]

> "We have developed an ultrasonic device that monitors changes in cranial diameter pulsation non-invasively so that we can evaluate ICP dynamics in astronauts during spaceflight."

The skull, it's sutures and dural membranes, like other parts of the human body, appears to function as a tensegrity structure

A "tensegrity structure" is one which is held together by reciprocal tension, rather than one which is locked rigidly in place. Think of a bicycle wheel, held together by tension on the spokes, as opposed to a wagon wheel (pushed apart my rigid spokes. Most parts of the body are tensegrity structures; for example, the sacrum is suspended between the ilia by ligamentous tension, rather than being locked there. Even individiual cells are thought to be held together by tensegrity. The cranium appears to be no exception. Tensegrity structures can be spring-like.

Cellular harmonic information transfer through a tissue tensegrity-matrix system.[14]

> "Cells and intracellular elements are capable of vibrating in a dynamic manner with complex harmonics, the frequency of which can now be measured and analyzed in a quantitative manner by Fourier analysis. Cellular events such as changes in shape, membrane ruffling, motility, and signal transduction occur within spatial and temporal harmonics that have potential regulatory importance. These vibrations can be altered by growth factors and the process of carcinogenesis. It is important to understand the mechanism by which this vibrational information is transferred directly throughout the cell. From these observations we propose that vibrational information is transferred through a tissue tensegrity-matrix which acts as a coupled harmonic oscillator operating as a signal transucing system from the cell periphery to the nucleus and ultimately to the DNA. The vibrational interactions occur through a tissue matrix system consisting of the nuclear matrix, the cytoskeleton, and the extracellular matrix that is poised to couple the biologic oscillations of the cell from the peripheral membrane to the DNA through a tensegrity-matrix structure. Tensegrity has been defined as a structural system composed of discontinuous compression elements connected by continuous tension cables, which interact in a dynamic fashion. A tensegrity tissue matrix system allows for specific transfer of information through the cell by direct transmission of vibrational chemomechanical energy through harmonic wave motion."

A model of the cranial vault as a tensegrity structure, and its significance to normal and abnormal cranial development.[15]

> "In a tensegrity structure, a change in any one tension or compression element causes the whole shape to alter or distort, through reciprocal tension, distributing the stresses to all other points of attachment."

Living bone is pliable, not rigid

One of the arguments sometimes used to reject the idea of working with cranial rhythmic motion, is the fact that the spheno-basilar symphysis becomes ossified. Using this fact as an assumption that therefore the bone will be rigid is to confuse the characteristics of living tissues with dead ones.

The mechanics of cranial motion–the sphenobasilar synchrondosis (SBS) revisited[16]

"This article suggests that the apparent motion of the SBS instead takes place by a change in shape of the anterior body of the sphenoid, and that this motion is accommodated by the superior orbital fissure. This new model can be used to derive cranial bone motion patterns directly from the assumption that the cranium changes its lateral diameter, and elegantly explains the well-known 'four interlinked gears' description of the occiput–sphenoid–vomer/ethmoid train. The model does not require sutures to be patent or membranous, since it applies equally well to ossified suture relics."

The role of collagen in bone strength[17]

"Bone is a... viscoelastic material."
"Bone matrix is a two-phase system in which the mineral phase provides the stiffness and the collagen fibres provide the ductility and ability to absorb energy (i.e., the toughness). Alterations of collagen properties can therefore affect the mechanical properties of bone and increase fracture susceptibility."

There is radiographic confirmation that external manipulation of the cranium can alter cranial bone movements

Radiographic evidence of cranial bone mobility.[18]

"Twelve adult patient charts were randomly selected to include patients who had received cranial vault manipulation treatment with a pre- and post-treatment x-ray taken with the head in a fixed positioning device. The degree of change in angle between various specified cranial landmarks as visualized on x-ray was measured. The mean angle of change measured at the atlas was 2.58 degrees, at the mastoid was 1.66 degrees, at the malar line was 1.25 degrees, at the sphenoid was 2.42 degrees, and at the temporal line was 1.75 degrees. 91.6% of patients exhibited differences in measurement at 3 or more sites."

The cranial rhythmic motion consists of multiple, overlapping wave forms.

This is consistent with the fact that multiple drivers of cranial rhythmic activity have been radiologically identified.

Osteopathy in the Cranial Field[19]

[This fact was highlighed by Magoun in his text in 1976, based on numerous studies (which have not been included here, because the original text was not available at the time of writing) but most subsequent researchers who were looking for "inter-examiner reliability" seem to have assumed that they should be looking for agreement about the velocity of a single rhythm. His findings were confirmed by Myers based on photographic evidence (see below).]

Measurement of small rhythmic motions around the human cranium in vivo[20]

> "Subjects prepared by placing 3mm retro-reflective targets on the face and attaching a heart rate and respiration monitor... Subject is photographed while supine for various time series..."
> "The Fourier analysis of the 30 measurements taken on 29 healthy subjects revealed a complex wave form with up to 8 frequencies significant at 95% confidence intervals."
> "It is postulated that the CRI as described in various studies is, in fact, a group of frequencies, and the ability of the operator to focus on a rhythm may depend on their physiological state and their training, therefore leading to poor inter-examiner reliability."

We are capable of focussing on one particular wave form within multiple overlapping wave forms; human selective attention is very powerful.

This is most easily demonstrated by our ability to focus on, and interpret, the speech of one particular person in a crowded room with a lot of conversations. (Sound itself being a series of overlapping wavee forms). We can then refocus to listen to a different conversation.

The role of working memory in tactile selective attention.[21]

> "We examine the extent to which tactile selective attention also depends on working memory. In Experiment 1, participants focused their attention on continuous target vibrations while attempting to ignore pulsed distractor vibrations. In Experiment 2, targets were always presented to a particular hand, with distractors being presented to the other hand. In both experiments, a high (vs. low) load in a concurrent working memory task led to greater interference by the tactile distractors. These results establish the role of working memory in the control of tactile selective attention, demonstrating for the first time that the principles of load theory also apply to the tactile modality."

Cortical dynamics of selective attention to somatosensory events.[22]

> "We examined attentional effects on human somatosensory oscillations during median nerve stimulation by conducting time-frequency analyses of neuromagnetic recordings in healthy adults. We found that selective attention modulated somatosensory oscillations in the alpha, beta, and gamma bands that were both phase-locked and non-phase-locked to the stimulus. "

Principles of part-whole selective perception by dynamic touch extend to the torso.[23]

> "The haptic subsystem of dynamic touch expresses a novel form of part-whole selective perception."

As expected from what we know, studies of inter-examiner reliability in palpating the frequency of the cranial rhythmic impulse have shown that different people palpate different rhythms.

When there is as much going on as their with the cranial rhythmic impulse, asking for two people to agree that they are focussing on the same thing is a lot like asking two people to view an expansive panorama, talk about one thing they see, and then dismissing their ability to see anything at all because they don't describe the same thing.

Interrater reliability of craniosacral rate measurements and their relationship with subjects' and examiners' heart and respiratory rate measurements.[24]

> "Measurements of craniosacral motion did not appear to be related to measurements of heart and respiratory rates, and therapists were not able to measure it reliably. "

Craniosacral rhythm: reliability and relationships with cardiac and respiratory rates.[25]

> "The results indicated that a single examiner may be able to palpate the rate of the CSR consistently"
> "The rate of the CSR palpated by two examiners is not consistent. The results of the regression analysis of one examiner offered no validation to those of the other. It appears that a subject's CSR is not related to the heart or respiratory rates of the subject or the examiner."

Simultaneous palpation of the craniosacral rate at the head and feet: intrarater and interrater reliability and rate comparisons.[26]

> "The results did not support ... claims that craniosacral motion can be palpated reliably."

Intraexaminer and interexaminer reliability for palpation of the cranial rhythmic impulse at the head and sacrum.[27]

> "Intrarater reliability for examiners at either the head or the sacrum was fair to good, significant intraclass correlation coefficients ranging from +0.52 to +0.73. Interexaminer reliability for simultaneous palpation at the head and the sacrum was poor to nonexistent, ICCs ranging from -0.09 to +0.31. There were significant differences between rates of CRI palpated simultaneously at the head and the sacrum."

Clinical conditions can be correlated with a failure of tissues to move appropriately

Fixed spinal cord: diagnosis with MR imaging.[28]

> "Pulsatile motion of the spinal cord was examined with phase imaging techniques. Sagittal images of the spinal cord were obtained at different times of the cardiac cycle in healthy volunteers, as well as in patients in whom the spinal cord either was tethered, was compressed, or contained an intramedullary lesion. Pulsatile velocity changes of the spinal cord, observed on the phase images, were most marked at the cervical-upper thoracic level. Cord motion was found to be significantly decreased in cases in which the cord was either tethered or compressed."

The cranial rhythmic impulse and excessive crying of infancy.[29]

> "Excessive crying was associated with an abnormal CRI at 2 weeks ($p<0.001$)"

Suture restriction of the temporal bone as a risk factor for acute otitis media in children: cohort study[30]

"Occurrence of AOM [acute otitis media] diagnosed by physicians blinded to temporal bone status was the main outcome."
"Severe suture restriction of the temporal bone was identified in 23 children (35.9%). At least one AOM episode was diagnosed in 14 (48.3%) of the ears associated with temporal bones previously identified as having severe suture restriction and in 28 (28.3%) of those without severe suture restriction. Higher risk for AOM was explained by severe suture restriction of the temporal bone (adjusted relative risk (RR), 2.26, 95% CI 1.43 to 2.91, p<.01), pacifier use (RR, 2.59, 95% CI 1.51 to 3.22, p<.01) and younger age (RR, 0.22, 95% CI 0.10 to 0.52, p=.001)."
"The study results indicate that severe suture restriction of the temporal bone is a risk factor for AOM in young children."

Cranial treatment can bring about physiological changes

Cranial manipulation can alter sleep latency and sympathetic nerve activity in humans: a pilot study.[31]

"The current study is the first to demonstrate that cranial manipulation, specifically the CV4 [compression of the 4th ventricle] technique, can alter sleep latency and directly measured MSNA [muscle sympathetic nerve activity] in healthy humans. These findings provide important insight into the possible physiologic effects of cranial manipulation."

Physiological effects of a CV4 cranial osteopathic technique on autonomic nervous system function: A preliminary investigation[32]

"Heart rate variability, respiration rate, galvanic skin resistance and skin temperature were measured in ten subjects (six females, four males) in an experiment consisting of five generic phases"
"On examination of heart rate variability, it became apparent that three subjects may have responded in a manner that was consistent with an increase in parasympathetic activity during the treatment phase. This identification leads to the notion that there may be both ‘responders’ and ‘non-responders’ to cranial treatment."

Effect of Osteopathy in the Cranial Field on Visual Function—A Pilot Study[33]

"Several variables in the present study demonstrated statistically significant postintervention effects within both the treatment (ie, osteopathy in the cranial field) group and the control group. Postintervention pupillary size in bright illumination OD showed a statistically significant effect in the treatment group vs the control group."

Effect of cranial osteopathic manipulative medicine on cerebral tissue oxygenation.[34]

"Cranial OMM [osteopathic manipulative medicine] augmentation and suppression techniques and sham therapy were randomly applied to healthy adults. During cranial OMM and sham therapy, S(CT)O(2) of the prefrontal cortex was determined bilaterally by using near-infrared spectroscopy. Heart rate, blood pressure, and systemic arterial blood oxygen saturation (SaO(2)) were also measured."
"The cranial OMM suppression technique effectively and progressively reduced S(CT)O (2) in both prefrontal lobes with the treatment time."

Changes in alpha band activity associated with application of the compression of fourth ventricular (CV-4) osteopathic procedure: a qEEG pilot study.[35]

> "Participants were randomly distributed in control, sham-CV4 and CV4 conditions using a cross-over design. qEEG activity was recorded for each of the 10 subjects in each of the 3 conditions. There was a significant increase in the alpha absolute power between pre and post in the CV-4 condition."

There are a number of studies evaluating the effectiveness of cranial treatment for a wide range of clinical conditions and patient types.

The following studies are listed in chronological order.
The methodological quality of these studies was variable; most used controls and blined examiners. Some were only pilot studies.
Note that this list did not attempt to be exhaustive. Note also that single case studies (of which there were a number) have not been included. It has not included some of the older studies; particularly if the examiners did not appear to have been blinded, or if there was not enough information to reproduce the findings.

The use of osteopathic manipulative treatment as adjuvant therapy in children with recurrent acute otitis media.[36]

> Acute otitis media: "The results of this study suggest a potential benefit of osteopathic manipulative treatment as adjuvant therapy in children with recurrent AOM [acute otitis media]; it may prevent or decrease surgical intervention or antibiotic overuse."
> "Treatments were gentle techniques on areas of restriction consisting of articulation, myofascial release, balanced membranous tension (according to teachings of William Garner Sutherland, DO, and others25), balanced ligamentous tension, facilitated positional release, and/or counterstrain treatments. "

A preliminary assessment of the impact of cranial osteopathy for the relief of infantile colic[37]

> "A progressive, highly significant reduction between weeks 1 and 4 in crying (hours/24 h), was detected ($p<0.001$) in treated infants; similarly there was a significant improvement in the time spent sleeping ($p<0.002$). By contrast, no significant differences were detected in these variables for the control group. Overall decline in crying was 63% and 23%, respectively, for treated and controls; improvement in sleeping was 11% and 2%. Treated infants also needed less parental attention than the untreated group."

The impact of acupuncture and craniosacral therapy interventions on clinical outcomes in adults with asthma.[38]

> "When treatment was compared with the control group, statistically treatment was significantly better than the control group in improving asthma quality of life, whereas reducing medication use with pulmonary function test results remained the same."
> "Acupuncture and/or craniosacral therapy are potentially useful adjuncts to the conventional care of adults with asthma, but the combination of the two does not provide additional benefit over each therapy alone."

Osteopathy may decrease obstructive apnea in infants: a pilot study[39]

> "The results of the second polysomnographic recordings showed a significant decrease in teh number of obstructive apneas in the osteopathy group (P=0.01, Wilcoxon test), in comparison to the control group showing one a trend suggesting a gradual physiologic decrease of obstructive apneas. However, the difference in the decline of obstructive apneas between the groups after treatment was not significant (p-0.43)."

Effectiveness of osteopathy in the cranial field and myofascial release versus acupuncture as complementary treatment for children with spastic cerebral palsy: a pilot study.[40]

> "Fifty-five patients were included in the study. Individual analyses of the 11 outcome variables revealed statistically significant improvement in two mobility measures for patients who received OMT--the total score of Gross Motor Function Measurement and the mobility domain of Functional Independence Measure for Children (P<.05). No statistically significant improvements were seen among patients in the acupuncture treatment arm."

Craniosacral still point technique: exploring its effects in individuals with dementia.[41]

> "A mixed methodology was used to explore the effects of craniosacral still point technique (CSPT) in 9 older adults with dementia. Participants were monitored at baseline (3 weeks), intervention (6 weeks), and postintervention (3 weeks) using the modified Cohen-Mansfield Agitation Inventory (M-CMAI). CSPT [raniosacral still point technique] was implemented daily for 6 weeks by a certified craniosacral therapist. Findings indicated a statistically significant reduction in M-CMAI total and subscale scores during the intervention period. This reduction continued during postintervention for subscale scores of physical nonaggression and verbal agitation. Staff and family interviews provided convergent validity to the quantitative findings. Participants were also more cooperative during caregiving activities and displayed meaningful interactions."

Effect of craniosacral therapy on lower urinary tract signs and symptoms in multiple sclerosis[42]

> "Comparison of post voiding residual volume, lower urinary tract symptoms and quality of life before and after craniosacral therapy revealed a significant improvement (0.001>p>0.0001). CST was found to be an effective means for treating lower urinary tract symptoms and improving quality of life in MS patients."

Therapeutic effects of cranial osteopathic manipulative medicine: a systematic review.[43]

> "Of the 8 studies that met the inclusion criteria, 7 were randomized controlled trials and 1 was an observational study. A range of cranial OMM techniques used for the management of a variety of conditions were identified in the included studies. Positive clinical outcomes were reported for pain reduction, change in autonomic nervous system function, and improvement of sleeping patterns. Methodological Downs and Black quality scores ranged from 14 to 23 points out of a maximum of 27 points (overall median score, 16)."

Cranial osteopathy for children with cerebral palsy: a randomised controlled trial.[44]

"Compared with children in the control group, carers of children receiving cranial osteopathy were nearly twice as likely to report that their child's global health had 'improved' at 6 months rather than 'decreased' or 'remained the same' (38% vs 18%; odds ratio 2.8, 95% CI 1.1 to 6.9)"
"This trial found no statistically significant evidence that cranial osteopathy leads to sustained improvement in motor function, pain, sleep or quality of life in children aged 5 -12 years with cerebral palsy"

Exploring the impact of osteopathic treatment on cranial asymmetries associated with nonsynostotic plagiocephaly in infants.[45]

"These clinical findings support the hypothesis that osteopathic treatments contribute to the improvement of cranial asymmetries in infants younger than 6.5 months old presenting with NSOP [nonsynostotic occipital plagiocephaly] characteristics."

Effects of comprehensive osteopathic manipulative treatment on balance in elderly patients: a pilot study.[46]

"The OMT protocol consisted of the following elements: Soft-tissue and myofascial release at T1 to L5 and sacral \“rock\” (patient prone) (3-4 minutes); myofascial release in the shoulders and scapulae bilaterally26 (patient lateral recumbent) (4-5 minutes) Cervical spine myofascial, counterstrain,muscle energy, or soft-tissue techniques for release and correction (patient supine) (3-4 minutes); Occipitoatlantal and condylar decompression (1-2 minutes) Venous sinus technique (5-6 minutes) V-spread, frontal and parietal lifts, or both (2-3 minutes); CV4 technique26 (3-4 minutes); Recheck for other key tender points (2-3 minutes) and treat according to findings"
"The OMT group had significantly reduced sway for the eyes-open test after 4 visits (P=.001)"
"The OMT protocol used in the present study improved the postural stability of healthy elderly patients, as measured by changes in sway values."

Multipractitioner Upledger CranioSacral Therapy: descriptive outcome study 2007 -2008.[47]

"Outcome by diagnostic groups suggested that UCST [Upledger craniosacral therapy] is particularly effective for patients with headaches and migraine, neck and back pain, anxiety and depression, and unsettled babies. Seventy percent (70%) of patients on medication decreased or discontinued it, and patients' average general practitioner consultation rate fell by 60% in the 6 months following treatment."

A randomized controlled trial investigating the effects of craniosacral therapy on pain and heart rate variability in fibromyalgia patients.[48]

"After 20 weeks of treatment, the intervention group showed significant reduction in pain at 13 of the 18 tender points ($P < 0.05$). Significant differences in temporal standard deviation of RR segments, root mean square deviation of temporal standard deviation of RR segments and clinical global impression of improvement versus baseline values were observed in the intervention group but not in the placebo group. At two months and one year post therapy, the intervention group showed significant differences versus baseline in tender points at left occiput, left-side lower cervical, left epicondyle and left greater trochanter and significant differences in temporal standard deviation of RR segments, root mean square deviation of temporal standard deviation of RR segments and clinical global impression of improvement."
"Craniosacral therapy improved medium-term pain symptoms in patients with fibromyalgia."

A systematic review to evaluate the clinical benefits of craniosacral therapy.[49]

"Only seven studies met the inclusion criteria, of which three studies were RCTs and four were of observational study design. Positive clinical outcomes were reported for pain reduction and improvement in general well-being of patients. Methodological Downs and Black quality scores ranged from 2 to 22 points out of a theoretical maximum of 27 points, with RCTs showing the highest overall scores."

"This review revealed the paucity of CST research in patients with different clinical pathologies. CST assessment is feasible in RCTs and has the potential of providing valuable outcomes to further support clinical decision making. However, due to the current moderate methodological quality of the included studies, further research is needed."

Craniosacral therapy in chronic neck pain patients–a randomised sham-controlled trial[50]

"Preliminary intention-to-treat analysis revealed significant less pain intensity in the CST group compared to the sham group ($p = 0.017$). With time, group differences on neck-pain-specific disability and pressure pain thresholds showed a positive trend, but did not achieve the level of significance. CST patients reported also strong global improvement, while the sham group rated between “no change” and only "a little better"."

Comparison of gait training versus cranial osteopathy in patients with Parkinson's disease: a pilot study.[51]

"A physiotherapy subtype is gait training (GT), which aims on correction of posture and gait re-education in patients with Parkinson's disease (PD). Osteopathy in the cranial field (OCF) is a gentle manual method to treat dysfunctions of the central nervous system."
"GT improves walking behaviour with a specific focus on an optimised performance of the necessary movement sequences regarding their accuracy and amplitude. As OCF decreased the interval, it ameliorates speed of motion execution during gait. GT and OCF enhance different aspects of gait in PD."

Effect of osteopathic manipulative treatment on length of stay in a population of preterm infants: a randomized controlled trial.[52]

> "Results showed a significant association between OMT [osteopathic manipulative therapy] and LOS [length of stay] reduction (mean difference between treated and control group: -5.906; 95% C.I. -7.944, -3.869; $p<0.001$). OMT was not associated to any change in daily weight gain."
> "The present study suggests that OMT may have an important role in the management of preterm infants hospitalization."

Is craniosacral therapy effective for migraine? Tested with HIT-6 Questionnaire.[53]

> "Immediately after treatments and one month afterwards there was significant lowering in HIT-6 scorings compared with prior to treatment. There was also significant difference in HIT-6 scorings between Times 1 and 4 ($p = 0.004$). The effect size was 0.43-0.55."
> "The results indicate that craniosacral treatment can alleviate migraine symptoms."

The difference between the impact of work in the cranial field, and the placebo effect, can be measured.

This relates to a study on a study; the actual study results are reported above. This study reported on the possibility that other factors were at work.

Credibility of a comparative sham control intervention for Craniosacral Therapy in patients with chronic neck pain.[54]

> "Patients' expectancy, credibility and therapeutic alliance did not appear to affect study outcomes, blinding patients to group allocation was possible, and sham intervention was tolerable and safe."

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