The Influence of Osteopathy on Early Pediatric Neurodevelopment -
A General Approach to Treatment.

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Hypothesis

My hypothesis is that a customized osteopathic treatment during early paediatric existence will positively influence neurological development.

Etiological factors:

According to the University of California, there are more than 600 neurological disorders. The category of neurodevelopmental disorders, as set out in the DSM-5, includes: attention deficit hyperactivity disorder (ADHD), autism spectrum disorder (ASD), communication disorders, intellectual developmental disorder, motor disorders, and specific learning disorders. It’s not unusual for these disorders to co-exist and be multifactorial.

Viola Frymann D.O. published a study in 1966, entitled “Collected Papers”, which determined that 1105 out of 1250 children with behavioural abnormalities had spheno-occipital or occipital dysfunction.¹ Much of this dysfunction can be contributed to lesion patterns that manifest from the birthing process. During labour and delivery the infant sustains a profound amount of trauma, even in what is considered a “normal” delivery. If not corrected, the trauma sustained during the birthing process can have a profound effect on an infant’s early development, leading to an inability of the child to reach their maximum potential, by no fault of their own. With an increase in the prevalence of autism spectrum disorders we must take into consideration the effects of the birthing process, and the upsurge of medical intervention during this process, on a child’s early development.

- Normal labour: 87% of babies are born with the occiput anterior and to the right or left²
- Abnormal delivery:
  - Abnormal maternal pelvis: this can cause extreme moulding of the head as it passes through the birth canal.
  - Abnormal presentation (ie. Breech): can cause the head to compress more rapidly and to a greater degree and position the occiput posterior.
  - Abnormal time (ie. premature): the same force is exerted upon the infant with less physiological development to withstand it.
  - Abnormal forces: too rapid of a delivery can cause excessive compression, or too rapid of compression, of the fetal head leading to membranous strain or tearing. Comparatively, too slow of a delivery can lead to excessive molding must during the second stage of labour.
  - Abnormal delivery: improper use of forceps or a vacuum is bound to distort head; traction in a breech position produces a pull on the dural tube surrounding the cord and can cause serious basilar distortion.
  - Abnormal oxygen supply caused by faulty placental attachment or anaesthesia of the mother during labour.

² Sutherland, William. Osteopathy in the Cranial Field (Denver: Harold Ives Magoun, 1951) pg. 181
At the time of birth a newborn’s cranium consists of 45 individual boney components, has approximately 100 billion neurons and weighs approximately 12 ounces. The brain has enormous adaptability and tremendous plasticity when given an optimal environment to thrive. The soft bones of the skull mould and overlap as the strong contractions of the uterus move the infant down and out of the birth canal. The distortions of the head during labour are usually released naturally with the intraoral vacuum created when feeding and crying, while also contributing to the formation of the cranial base. “With the first breath and subsequent vigorous cries the fluctuation of the cerebral spinal fluid and the pull of the membranes realign the cranial bones…complete restoration or "blowing out" should take place in four or five days.” 3 If the birth was traumatic and the distortions remain, there could be negative repercussions to the child’s growth and development due to the necessary adaptation of the child to the pattern of strain. These effects include:

- Edema
- Membranous articular lesions:
- Soft tissue lesions
- Fracture
- Hemorrhage

Spinal anomalies and curvatures:

“Anomalies at the cranial base brought about by birth trauma are a source of structural anomalies such as short leg, abnormal facets, dissimilarity of the laminae and pedicles as well as curvatures. Excessive flexion at the cranial base will tend to invite anteroposterior curves of the spine which are normal to the erect posture. Excessive extension at the base on the other hand will invite exaggerated curves of the lordotic or kyphotic types.” 4 Suffice it to say that the essence of the problem that influences growth patterns is the absence of the balance and symmetry.

**Lesion Diagnosis:**

Neurologically an infant is reasonably immature, consequently injuries are less likely to appear right away unless severe. The injuries tend to manifest either as a developmental abnormality or inability, making diagnosis difficult, therefore it is imperative the practitioner take an in depth and thorough patient history and assessment.

1. **History**
   a. **Delivery**
   b. **Appearance:** eyes, pupil dilation, skin colour, tissue texture, edema
   c. **Action**
      i. Crying
      ii. Feeding and saliva production
      iii. Digestion/evacuation
      iv. Breathing
      v. Heart rate

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3 Sutherland, William. Osteopathy in the Cranial Field (Denver: Harold Ives Magoun, 1951) pg. 182
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vi. Muscular activity: coordinated, tremors, flaccidity, spasticity  

vii. Sleep-wake cycle  

viii. Reflexes: Babinski’s, sucking/swallowing reflex, grip reflex  

ix. Interaction: response to stimuli (verbal, auditory, tactile, kinesthetic) emotional state, signs of stress  

2. Observation  
   a. Normal development timetable  
   b. Abnormal development  

3. Palpation – static/dynamic: Assess the symmetry of the cranial base and additional cranial bones, the facial bones, neck, shoulders and pelvic bones. Consider the patient’s body position.  

4. Evaluate the cranial rhythmic impulse  

Treatment Approach:  

Treatment should be approached on three levels, osseous, membranous and fluid. Structural alignment of the vertebral column and all supplementary boney structure is of the utmost importance for proper physiological function. Intracranial and spinal membranes must be without tension and fluid must move freely. Slight indentations of the cranium should only be visible and palpable for approximately ten days after birth; any longer can lead to dysfunction, or may indicate a pre-existing lesion and require monitoring by medical doctor and osteopath.  

Lesion types:  
- Developmental: gradual occurrence from an uncorrected lesion pattern. Treatment includes molding of the cranial bones, to encourage normal development, and correction of the entire physical lesion pattern.  
- Traumatic: sudden occurrence. Treatment would include disengagement followed by moulding techniques.  

*Moulding: direct pressure on the convexity of a cranial bone to normalize its shape and position.  
*Disengagement: release of the membranous pull of the reciprocal tension membrane and spinal membranes.  

There are two types of lesions that would require molding:  
1. Prominences: requires pressure on the convexity with a spreading motion towards the periphery. The surrounding bones and fluid are also directed towards the periphery to help accommodate the flattening of the prominent bone.  
2. Flattened areas: bones must be pull together towards the flat area with fluids being directed to assist with doming and membranes at a balance point.  

Keeping in mind the above mentioned information, treatment protocol is as follows:  
- Engage cranial rhythmic impulse  
- Release diaphragms:  
  - pelvic  
  - respiratory  
  - thoracic inlet  
  - cranial base  
- Restore symmetry to sacrum and pelvis.
- Dural tube traction
- Assess and correct and spinal misalignment
- Cranial vault release
- Occipital/base release
- Disengagement and moulding of prominences or flattened areas
- Still point and cranial rhythmic impulse re-evaluation

It is imperative to restore the cranial rhythmic impulse as it is responsible for growth in the cranial bones and their membranous attachments; it also aids in the forced cranial expansion caused by brain growth. Reduced activity at a cranial suture causes ossification to begin, dysfunctions in the neurocranium and viscerocranium must be corrected before craniosynostosis.

**Conclusion:**

Osteopathy works with the body’s innate ability to heal itself, and in children this response is very strong and often results in a quick recovery. When strain patterns are released and rebalanced throughout the body, the lymphatic, neural, cerebrospinal fluid and vascular pathways are able to respond more efficiently. When there is efficiency and homeostasis within the body, the healing process can begin. Unresolved birth stresses and the body’s compensation to them, can be the root cause of many developmental issues in early childhood. These stresses can usually be treated effectively soon after birth when the child is still so adaptable, yet become progressively more difficult to eliminate the longer they remain unresolved. Treatment of the gastrointestinal system, as it is the second largest concentration of nerves outside the brain, through mobilization of the pelvis, ribs and spine, can decrease any strain through the abdomen and improve nerve and blood supply to the intestinal tract. With treatment of the musculoskeletal system there will be a reduction in soft tissue strain leading to a reduction in input on the nervous system. “Another effect is to help bring the autonomic nervous system (ANS) into balance, which reduces stress and assists digestion. The relaxation of the locomotor system produces such effects as easing or resolving headaches and back pain. The state of tension of the connective tissue is one of the elements that influences whether the craniosacral rhythm can be sensed over the whole body and how even the rhythm is. Another positive effect is on lymphatic flow and freedom of respiration. Parts of the hormonal system also receive support. These control emotional reactions, sleep, hormone secretions, etc…”

^5 There are other causative factors for early developmental issues, like genetic factors or nutritional deficiencies that should also be taken into consideration. Each patient and each case is unique. Osteopathic treatment promotes optimal development of each child.

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