

*The "Journal" is a regular feature in which Rolf Institute members may explore topics on Rolfing and Rolfing Movement Integration philosophy and technique; share creative writing of interest to our readers; and discuss practice building and management. The ideas and concepts here are an exchange among colleagues who are not being spokespersons for the Rolf Institute or its teaching faculty when they contribute to this part of Rolf Lines.*

## THE PROBLEM OF CRANIAL MOVEMENT

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Many Rolfers have recently become interested in techniques of cranial manipulation. In doing so, we often uncritically adopt the assumptions underlying these techniques without questioning their scientific and anatomic bases. There is a significant difference of opinion between anatomists and the various schools of cranial movement specialists as to the very existence of "cranial movement". Chiropractic and osteopathic techniques (Sacral Occipital Therapy, Craniosacral Therapy, Cranial Osteopathy, etc.), presuppose a hinging motion at the sutures of the skull. Upledger, for example, asserts that "sutures do allow small amounts of movement between their component bones"<sup>1</sup> and that "restoration of sutural mobility is desirable."<sup>2</sup>

In orthodox anatomy, cranial sutures are considered to be stable, non movable interfaces between cranial bones. Anatomists insist that adult cranial bones have completely fused together. "Not all junctions between bones are constructed to allow movement. Sutures are usually shaped to interlock...Obliteration of the sutures of the vault...takes place as age advances. It may commence between the ages of thirty and forty on the inner surface...but the times at which the sutures close are subject to great variations...it is clearly necessary that sutures should cease to function as mobile joints as rapidly as possible after birth"<sup>3</sup> (emphasis is mine).

In the light of current scientific understandings, hinged flexion and extension of the cranial bones is patently impossible. One anatomist writes that there is no legitimate "scientific evidence to support the claim of movement between the cranial bones in adult humans. The scientific literature does acknowledge that cranial bones do not always fuse, but to anatomists this only means that the cranial suture(s) is still visible, not that any movement is present (emphasis is mine). On the contrary, individuals, who must resist abnormally large forces which might ordinarily result in cranial bone movement, exhibit interdigitation of the cranial bones as a means of reinforcing the suture to prevent bone movement. As for carnivores like canids and felids, their very survival is dependent upon cranial bone fusion. Only a rigid skull mass allows the prey capture typified by this group. Cranial bone movement does occur in some mammalian species, e.g. jack rabbit, but this phenomenon is so unique that it

merits scientific investigation. In the case of jack rabbits, the cranial bone movement appears to allow the animal to stabilize its ears which are used to locate prey and predators during rapid hopping."<sup>4</sup>

I have systemically described and worked with over a thousand large vertebrate skulls in the Hancock Collection of the Page Museum (La Brea Tar Pits) in Los Angeles. Cranial sutures in the adult large vertebrates I have studied interdigitate, lock, and then fuse together. Fusion so complete that no trace of the original suture lines can be seen; and, hence, movement of any significant order of magnitude is physically impossible. Talking about cranial motion as if it relies on imaginary hinges in the adult skull has no reference to anatomical reality.

Another problem arises when we consider the parietal-temporal suture, which is crucial to the argument for the existence of cranial motion. The beveled angle at the interface of the parietals and temporals need not, in my opinion, represent a functional hinge. I believe it is a developmental result of the constant cell growth rate around the curve of the skull. The inner layers of tissue have less distance to travel than the cells in the outer layer. This gives a beveled or angled shape to the sutural plane that does not necessarily reflect the presence of a functional hinge.

### A CREATIVE ALTERNATIVE

If sutures are nonmovable, how do we explain the perceived changes in cranial shape and volume? It is necessary to understand the nature of living, bony tissues to make sense of this apparent contradiction.

One common misconception about living bone is that it is extremely rigid. This view is reinforced by the appearance of non-living bone. Dehydrated, desiccated bone, such as laboratory specimens, used to study anatomy is very hard and brittle. Living cranial bones, on the other hand, are thin, hydrated structures that resemble tough, leathery membranes. They are relatively soft and are subject to being moved and stretched by mechanical stresses generated by the pressure wave that accompanies the circulation of the cerebro-spinal fluid (C.S.F.). In this context, the cranial bones rest between and are invested by layers of connective tissue. There are susceptible to being passively carried along by (and "surf" on) the C.S.F. wave.

In responding the C.S.F. rhythm, the head does not change shape as if its internal structural elements resemble rigid, curved plates which are restricted to motion only at their hinged borders. The careful observer will note that the head especially after the seventh session of Rolfing) changes shape very much

4 Betty Kay, Ph.D., RPT, *Physical Therapy Forum* (King of Prussia, PA, 1985), p. 7.

1 John E. Upledger and J.D. Vredevoogd, *Craniosacral Therapy* (Chicago, 1983), p. 152.

2 *Ibid.*, p. 312.

3 H. Gray, *Anatomy of the Human Body*, ed. C.M. Goss, 29th Am. ed. (Philadelphia, 1983), p. 150.

like a balloon which is slowly filling and emptying with water, with all points on its surface moving towards and away from center. No sutural hinging theory can accommodate this movement.

This model explains the responsiveness of the entire skull in response to pressure changes from within the fluid-filled cranial cavity. Motion occurs across sutural borders as well as within planes and regions of space occupied by individual cranial bones. Cranial bones are plastic structures that can actually change size and shape in response to local hydrostatic pressure variations. While the Rolf work employs the pliability of the cranium, it does not rely on the hinge-like movement theorized by joint manipulators.

If sutural motion were as important to the health of the living organism as proponents of the various cranial manipulation schools would have us believe, shouldn't dire consequences inevitably follow the complete fusion of the cranium? There are no documented consequences of health or well being that are associated with fusion of cranial sutures. Cranial motion can be palpated (and potentiated by Rolfing) in older individuals whose sutures should be completely fused.

#### IN CONCLUSION

Systems of cranial manipulation that derive their treatment rationale from sutural geometry and cranial bone relationships (elegant as they may be) have their conceptual and practical limits. I propose a model for the body's "upper pole" in which the head is composed primarily of hydrated, relatively pliant connective tissue. In this context, the role of specific cranial bones and their hypothetical relationships takes on less significance. I suggest that this view (which is based on the concept of system-wide plasticity) is more in line with the basic philosophy of Rolfing and more consistent with objectively verifiable anatomical reality.

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