



CRITICAL REVIEW

# Arguments for and against movement at the sphenoid-occipital synostosis: Furthering the debate



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## KEYWORDS

Clivus;  
Cranial osteopathy;  
Craniosacral therapy;  
John Upledger;  
Sphenobasilar synchondrosis (SBS);  
Sphenoid-occipital junction;  
Sphenoid-occipital synchondrosis;  
Sphenoid-occipital synostosis;  
William Sutherland

**Abstract** *Background:* The junction between the sphenoid and occipital bones fully ossifies by age 18, forming the *sphenoid-occipital synostosis*. William Sutherland and most subsequent craniosacral authors hold that, in adults, cranial motion is, in part, enabled by movement of the synostosis.

*Objectives:* To review arguments for and against movement at the synostosis, and the extent to which statements by craniosacral authors regarding the synostosis accord with the mainstream anatomical understanding of their day.

*Method:* A review of relevant literature, and an examination of a number of adult cranial bases, median skull sections and sphenoid bones.

*Results:* Within the craniosacral literature, scholarship regarding the junction is poor, with authors often failing to draw upon mainstream anatomical understanding.

Three cases have been made regarding movement at the adult junction: (1) it moves because it does not ossify (2) it ossifies but movement, nevertheless, continues and (3) ossification prevents continued movement.

150 years of mainstream anatomical understanding refute (1). Proponents of (2) argue that the preponderance of trabecular bone at the synostosis and clivus facilitates movement. However, Cook, who makes the most detailed case for (3), argues that the thickness of the clivus suggests it is “designed” not to move.

Proponents of (2) do not consider this point about clivus thickness, but, conversely, proponents of (3) generally do not consider the point that the majority of bone at the clivus is trabecular.

*Conclusion:* The debate over movement at the synostosis and clivus will progress when those involved explicitly address both of these important points.

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### Implications for clinical practice

- Three cases have been made regarding movement at the adult spheno-occipital junction: (1) it moves because it does not ossify (2) it ossifies but movement, nevertheless, continues and (3) ossification prevents continued movement.
- Whilst resolving what happens at the junction is a worthwhile endeavour in its own right, resolution would not seem necessary for clinical efficacy. After all, successful craniosacral practitioners have, by all accounts, included proponents of all three cases.
- Nevertheless, it is useful to review the implications of a lack of movement at the junction. Given that lesions are dysfunctional movement patterns, the obvious implication of there being no movement is that lesions can neither develop nor be removed through treatment.
- Cook holds that movement does not occur at the junction but describes it as “a location of stored energy” and as having “a ring of charge held round the outside surface”. However, he does not explore the implications of these observations for clinical practice.

## Introduction

According to William Sutherland, founder of cranial osteopathy, the cranium undergoes rhythmic flexion and extension, this cranial motion comprising one element of what he termed the *primary respiratory mechanism*.<sup>1</sup> (For summaries of research into cranial motion see Chaitow<sup>2</sup> and Seimetz et al.<sup>3</sup>)

Sutherland held that this cranial motion is, in part, enabled by movement at the junction of the sphenoid and occipital bones.<sup>1</sup> In the newborn, this junction consists of cartilage and, over time, turns to bone, with ossification complete sometime between the 11 and 18 years of age.<sup>4</sup> There appears to be agreement amongst craniosacral authors (authors from the fields of cranial osteopathy and craniosacral therapy) that movement occurs at the junction prior to ossification (“pre-ossification”). However, there is disagreement about what happens at the junction once ossification is complete (“post-ossification”). For whilst Sutherland and most craniosacral authors hold that

movement continues to occur, others hold that ossification prevents continued movement.

This paper reviews arguments for and against movement at the ossified junction. It does not claim to settle the question of whether movement occurs but, more modestly, aims to further the debate and stimulate discussion.

Whilst reviewing these arguments, the author became aware that, on occasion, statements about the junction made by craniosacral authors failed to accord with those in mainstream anatomical texts of their day. This was deemed sufficiently noteworthy to merit discussion.

The mainstream anatomical text drawn upon most heavily is *Gray’s Anatomy* (henceforth *Gray’s*). For much its history, there were distinct British and American editions of *Gray’s*, drawn on here as appropriate. For example, as Sutherland lived in America, his writings are compared to American editions of and prior to his day. Since 1985, only the English edition has remained in print, with the current (40th) edition published in 2008.<sup>5</sup>

## Joints

In this edition, joints are divided into those that are free moving (synovial) and those that are not (synarthroses). Synarthroses are then divided into fibrous and cartilaginous joints. An example of the former relevant here is a suture.

Cartilaginous joints are further divided into symphyses and synchondroses. In a symphysis, the bones are separated by fibrocartilage and, in a synchondrosis, by hyaline cartilage. As noted, ossification of the hyaline cartilage at the joint between the sphenoid and occipital bones is complete at between 11 and 18 years.<sup>4</sup> Until complete, the joint is a *synchondrosis*. Once complete, it becomes a *synostosis*.<sup>6</sup>

Much recent craniosacral literature continues to describe the joint between the sphenoid and occipital using the archaic *sphenobasilar synchondrosis* (SBS). However, since at least 1980, *Gray’s* has used the term *spheno-occipital synchondrosis* to describe the joint pre-ossification.<sup>7</sup> And as this is also the term used in *Terminologia Anatomica*<sup>8</sup> (the international standard on human anatomic terminology) and the *Foundational Model of Anatomy*<sup>9</sup> (a widely-recognized anatomical reference ontology), it is the one used here. The related terms *spheno-occipital synostosis* and *spheno-occipital junction* are also used. Whilst *spheno-occipital synostosis* appears in the *Foundational Model of Anatomy*, it does not in *Gray’s*. However,

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