

# A primary cranial analysis and adjustment method for all three Sacro Occipital Technique (SOT) Categories: A retrospective study of 85 patients

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**Introduction:** The intention of this paper is to present a cranial bone adjustment method that can be primarily used for all three Sacro Occipital Technique (SOT) categories, and to share a three-part cranial indicator analysis that specifies the needed side for the adjustment.

To help build a substantive rationale for this intervention a retrospective analysis of 85 patients was undertaken. Also shared is a five-part cranial adjusting procedure that can be used for all three SOT categories

**Methods:** A retrospective review of the records of 85 patients was performed to assess the three-part cranial indicator analysis to help determine the optimal side for the cranial adjusting of the zygoma.

**Results:** A consistency was found between analysis of craniofacial range of motion (ROM) testing and head tilt. These results helped guide the side and location to focus the craniofacial adjustments.

**Conclusion:** This retrospective study of 85 patients yielded interesting correlative findings for the indicators of lateral head tilt, zygomatic ROM, and facial analysis to determine optimal side of zygomatic adjustment.

**Indexing Terms:** Sacro Occipital Technique, SOT; Chiropractic; Cranial Facial Growth and Development; Lateral Head Tilt; Working Level; Cranial Manipulation.

## Introduction

The intention of this paper is to present a cranial bone adjustment method that can be primarily used for all three Sacro Occipital Technique (SOT) categories, and to share a three-part cranial indicator analysis that specifies the needed side for the adjustment. SOT categories consist of the operating principles of three primary functional systems of the body and methods of analysis and adjustment of those three systems. The three SOT categories are differentiated by SOT category defining indicators. Major Bertrand DeJarnette, the founder and developer of SOT, wrote in his 1980 seminar notes 'To bring order out of chaos SOT offers the category system'. (1)

Essentially the three SOT categories are 'centred on the function of the Central Nervous System, its attachments and structural stability throughout the entire

... Lessons from 85 patients inform this guide to the identification and correction of cranial faults involving the zygoma ...'



body'. (2)

- ▶ Category one addresses the function of the Primary Cranial Sacral Respiratory Mechanism (PCSRM). Respiratory (Nutation) refers to the inherent motion of the cranial sacral portions of the PCSRM that allows for tension on the dura and the movement of cerebral spinal fluid
- ▶ Category two is a unilateral problem of the body to maintain weight-bearing function with the ligamentous weight-bearing-portion of the sacroiliac primary
- ▶ Category three addresses lumbar subluxations, lumbar disk lesions and the condition of the sciatic nerve.

Both the cranial adjustment and the analysis in this study are based on the function of the zygoma bones of the mid-face and their surrounding cranial bones. These three indicators appear to have a significant relationship to each other as illustrated in this study of 85 patients. These patients were examined for Lateral Head Tilt, Zygomatic Ranges of Motion (ROM), and observed for comparative Facial Analysis (craniofacial growth and development) from December 2 through December 23, 2019, at the office of HG. They were not selected based on symptoms, SOT Category, or any other previous examination finding.

### The Zygomatic Bone

DeJarnette, the founder and developer of SOT, stated that *'The zygoma joins the face and the cranium. It is part of every temporal and frontal intraoral adjustment. It is essential to balance the facial and cranial structures'*. (3) DeJarnette further stated *'That we use the [zygomatic] arches in the sutural technique to align the face and the skull into one unit of function'*. (3) David Walther in his book *'Head, Neck and Jaw pain and Dysfunction, The Stomatognathic System'* makes the statement *'The zygomatic bone articulates with the maxillae, frontal and temporal bones with a serrated suture. These all can expand and contract'*. (4) Upledger writes in his book *'Cranial Sacral Therapy'* *'The physiologic nature of the suture determines the type of motion in which it participates and which it will allow'*. (5)

Additional key factors concerning the function of the zygomatic bone are that it forms a third of the circumference of the orbital fossae. The masseter muscle, the chief muscle of mastication, originates in the masseter portion of the zygoma. The zygoma has an important functional suture with the maxillae that is central to the cranium and craniofacial region and reliant on the deployment of teeth along with their subsequent occlusion. Facial bones are membranous in origin and adapt throughout life allowing for progressive remodelling, particularly as the sensory and respiratory organs and functional spaces of the face develop and grow.

Arey states *'Although the shape of a cranial bone and its architectural design are hereditary, the final arrangement is modified in conformity with the stresses encountered in post-natal life'*. (6) He continues *'Membranous tissue is a precursor to bone in cranial growth and development, in both the facial structures and the large plate bones of the cranium, allowing for accommodation to not only meet the demands of the respiratory and sensory organs and teeth but the growth of the brain as well'*. (6)

According to Guyton *'the shape of a bone can be rearranged for proper support of mechanical forces by deposition and absorption of bone in accordance with stress patterns'*. (7) Wolff's law emphasises that *'the shape of a bone depends upon the physical stresses applied to it'*. (8, 9) Considering that cranial facial bones are membranous the impact of demand, forces created by the growth and development of the facial organs, the functional spaces, and related tissues of the face, provides for a need for even greater accommodation. A fundamental premise of the *Functional Matrix Theory* of Melvin Moss (10, 11) focuses on how the soft tissue matrix (muscles, connective tissue, neural tissue) models the bone, rather than bone morphology being genetically determined.

## #1 Indicator: Lateral Head Tilt



Lateral head tilt is a form of postural asymmetry defined by the lower ear when standing on a plumb line. In other words, lateral head tilt is determined by the caudal ear's positioning with a right inferior ear position called a right lateral head tilt. DeJarnette referred to lateral head tilt as *'The second most significant indicator and may indicate that the human is shifting from well-being to health problems'*. (12) According to DeJarnette when examining for lateral head tilt the external occipital protuberance (EOP) should be lined up with the second sacral tubercle and the shoulders should be levelled as much as possible. Levelling the shoulders is extremely important since structural distortions often accompany the lateral head tilt, and the true lateral head tilt side can be altered in appearance by these accommodative distortions.

There are a multitude of reasons for a lateral head tilt such as anatomical leg lengths, pelvic unilateral differences, spinal distortions, visual/vestibular (13) problems and more. Chek stated that *'A head tilt finding must be correlated with a complete orthopedic and neurologic evaluation'*. (14) Interestingly in DeJarnette's cranial technique text he noted *'that cranial suture dysfunction altering head posture can be reflected throughout the entire postural system'*. (15)

## #2 Indicator: Zygoma Range of Motion (ROM)

The zygoma's range of motion findings (ROM) is determined by tissue (bone) pliability, compliance, and movement induced by finger pressure. Sensitivity of this motion is usually developed through palpation with repeated attempts with multiple subjects over a significant period of time. (16)

Marc Pick first discussed the 'working level concept' as a method of analysis for assessing cranial ROM as well as for cranial adjusting. *'Working level is more forceful than the surface touch (surface level) but not to the point where the person rejects the pressure applied or tissue rejection sets in (rejection level). Start out at surface level, proceed until you start to feel rejection and then back up slightly, this is working level. At working level, you should feel tissue release when adjusting and true tissue resistance when examining.'* (16)

It is important to remember, when you are adjusting the craniofacial and cranial vault bones, you are adjusting bones developed from membrane. DeJarnette writes that *'the vault bones originate in membrane and do not have articular motion but do have sutural membrane motion.'* (15)



Zygomatic (ROM) testing is done as follows:

- ▶ With the patient supine and the doctor sitting at the head of the table
- ▶ Contact the external inferior zygoma (cheek) on one side with your fingertips; stay lateral to the midline of the eye where the maxillary/zygoma suture is found
- ▶ The opposite hand contacts the frontal with the thumb on one side and the fingers on the other side
- ▶ Bring the frontal bone superior on the chosen side of zygoma superior pressure, done with your fingertips. Remember the working level concept
- ▶ Test both zygomas equally and feel for resistance while making sure that the head does not move
- ▶ The side of greater resistance of the zygoma (often more painful) is the side that is most in need of adjustment.

### #3 Indicator: Facial Analysis

Assessing facial bone growth and development indicators can be extremely helpful in identifying which zygoma is most in need of adjustment. The purpose of cranial facial analysis is to add another assessment tool to investigate any agreement of indicators for diagnostic purposes.

The facial/zygomatic indicators I find effective and most consistent with compromised craniofacial growth and development are the side of the face with:

- ▶ A lower superciliary arch
- ▶ The zygoma (cheek) appears flatter and smaller
- ▶ Decreased distance from the maxillary/zygomatic suture to the zygomatic arch of the temporal bone.

All three of these facial analytical visual observations are based on limited cranial facial growth and development of the facial bones on the side of lesser development when compared to the opposite side. In his book *'Facial Growth'* Donald Enlow states *'Development is a process working toward an ongoing state of aggregate, composite structural and functional equilibrium'*. (17, 18, 19) DeJarnette discusses in his 1976 *'Cranial Technique Manual'* that *'The [zygoma] is an equaliser between the maxillae and the temporal and sphenoid'*. (15) Also as previously stated the growth and development of cranial bones are responsive to the development of cranial soft tissue, sensory organs and functional spaces. (10, 11)

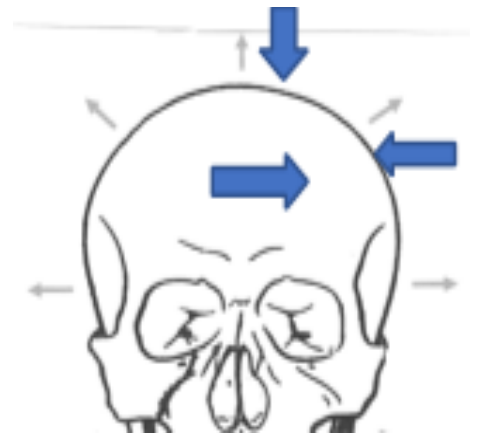
Walters notes regarding craniofacial morphology that *'The growth and development of the cranium is a process of outward displacement essential to life'*. (20) Also various stresses to the craniofacial region can lead *'to abnormal compensatory morphogenesis throughout the head and typically results in craniofacial dysmorphology'*. (21)

An interdependence appears where head position and cranial function can be altered by deficiencies in cranial growth and development and structural systems (SOT categories) are also responsive to head position and the function of the cranial facial structures.

### Retrospective patient assessment

All three indicators, lateral head tilt, zygomatic ROM and facial analysis were assessed at the same office visit and were not blind to each other. No one assessment informed another. A retrospective review of the records of these 85 patient revealed the 3 indicators determining the optimal side for the cranial adjusting of the zygoma. These showed a considerable amount of consistency.

1. Of the 85 patients studied, 80 of these patients had a lateral head tilt (lower ear)
2. Of the 80 patients studied that had a lateral head tilt, 71 of these patients had ipsilateral limitations on craniofacial (zygomatic) ranges of motion
3. Of the 9 patients with lateral head tilt they were found to have contralateral limitations on craniofacial (zygomatic) ranges of motion with ipsilateral facial analysis findings
4. Of the 80 patients with lateral head tilt, 67 of these patients had ipsilateral facial analysis (limited zygomatic growth and development) findings
5. Of the 13 patients with lateral head tilt that did not have ipsilateral facial analysis findings, 9 of these patients had contralateral facial analysis findings and ipsilateral limited zygomatic ranges of motion



6. All 5 patients without a lateral head tilt had both ipsilateral facial analysis findings and limited zygomatic ranges of motion.

We give our Report of Findings as Table 1.

Table 1: Report of findings	
Total Patients Examined	Total Patients with a Lateral Head Tilt
85	80
Total Patients Examined with a Lateral Head Tilt	Total Patients with a Lateral Head Tilt with Ipsilateral Limited Zygomatic Ranges of Motion (Limited Craniofacial Ranges of Motion)
80	71
Total Patients Examined with a Lateral Head Tilt	Total Patients with a Lateral Head Tilt with Ipsilateral Reduced Zygomatic Growth and Development (Positive Facial Analysis Findings)
80	67
Patients with Positive Facial Analysis Findings: 67 with Lateral Head Tilt and 5 of the initial 85 examined which did not have Lateral Head Tilt	Patients with Positive Facial Analysis Findings and Ipsilateral Limited Craniofacial Ranges of Motion
72	72

### Cranial Adjusting

The following five-part cranial adjusting procedure can be used for all three SOT categories and is directed by the three indicators listed earlier.

These five techniques are modifications from a multiple step sutural adjusting procedure originally published in DeJarnette’s 1979-1980 *Cranial Technique Text* (3) as well as in the book ‘*A Practical guide to Cranial Adjusting*’. (22) While this technique focuses on the zygomatic bone, due its relationship to the maxillae, frontal, and temporal bone as well as its effect on craniofacial and TMJ dynamics the adjusting of this bone and its adjacent sutures can have far reaching effects, particularly when applying it to the side directed by the three indicators.

#### Cranial Adjustment #1: Sutural Release

- Rotate the patient’s head to the L) for a R)- sided involvement.
- Place the right thenar firmly on the R) mastoid.
- L) hand will grasp the skull with the L) thumb contacting the *pterion* (area where temporal, sphenoid, parietal and frontal come together). The R) thenar and the L) thumb should pull away from





each other in a rhythmic stretch.

### Cranial Adjustment #2: Platysma Stretch

- For the L) platysma place your R)-hand fingers on the inferior zygoma surface and pull to the superior.
- At the same time the L) hand should make firm broad stabilising contact on the mid-clavicle, same side as R) hand.
- Stretch the platysma for 10s.



### Cranial Adjustment #3: Maxillary Spread



- Stand to the uninvolved side of the patient.
- Center the upper pad of your thumb on the hard palate (maxillae) of the involved side and with the other hand, stabilise the frontal.
- Lift your thumb firmly (at working level) against the hard palate and then roll it laterally.

### Cranial Adjustment #4: Maxillary Straddle

- Stand to the side of the patient.
- The thumb and the index finger should straddle the maxillary arch (thumb on one side with the index finger on the other) either on the inside of the mouth or on the outside.
- The other hand stabilizes the frontal while the hand on the maxillary arch works to rotate the maxillae, back and forth.



## Cranial Adjustment #5: Zygoma Adjustment



- Stand to the side of the patient, whichever side is more comfortable.
- Enter the mouth and place the tip of the index finger on the inferior zygomatic arch slightly lateral to the midline of the eye (the midline of the eye lines up with the maxillary/zygoma suture).
- Work to lift the zygoma while stabilising the frontal.
- Keep in mind that, while adjusting at working level, respiratory diaphragmatic breathing can be of great assistance when making both analysis and adjustment of the cranium.

### Discussion

Based on the retrospective analysis of the 85 patients in this study it appears that the side of the lateral head tilt (low ear) seems to be a reliable indicator for the side in need of cranial adjustment, especially since it has a high level of consistency with both the zygomatic bone's ROM and facial indicators. The zygomatic bone with its central location within the mid-face, its relationship to the cranial sensory organs, functional spaces, membranous tissue and sutural function appears to be a primary site for improving and sustaining the primary needs of the cranium and craniofacial system.

As we have noted, lateral head tilt can be caused by multiple structural problems and physiological needs throughout the body. It also has been found clinically that adjusting the cranium is vital to improving and maintaining the three functional systems addressed by the SOT categories:

- ▶ Category one cranial adjustment is designed to enhance function of the dura
- ▶ Category two cranial adjustment is designed to enhance function of the cranial sutures
- ▶ Category three has one adjustment (basic three) to mediate pain of the lumbopelvic structures

There are limitations to this study since doctor pre-conceived notions and perceptions could affect interpretations of what is viewed and palpated. There was no blinding of the doctor to the three indicators used for assessment, however an attempt was made to not perform the assessment with any expectations.

The follow up retrospective of patient records between December 2 through December 23, 2019 was sequentially determined and the only issue being that patients seen more than once during this time period were included only once.

### Conclusion

This retrospective study of 85 patients yielded interesting correlative finding for the indicators of lateral head tilt, zygomatic ROM, and facial analysis to determine optimal side of zygomatic adjustment.

This cranial method of analysis and adjustment, as we have discussed in this paper is a product of the vast number of cranial methods taught by DeJarnette over seventy-five years of study, instruction, and publication.



We believe that these findings deserve further study to determine the appropriateness of generalising of the finding of this retrospective study to patients at large and to perform follow up outcomes for this assessment and treatment intervention.

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Cite: Getzoff H. A primary cranial analysis and adjustment method for all three Sacro Occipital Technique (SOT) Categories: A retrospective study of 85 patients. *Asia-Pac Chiropr J.* 2023;4.2. URL [apcj.net/Papers-Issue-4-2/#GetzoffCranial](http://apcj.net/Papers-Issue-4-2/#GetzoffCranial)

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