

MRI measured change in intracranial flow following upper cervical chiropractic care of a migraine headache subject—a case report

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BACKGROUND

- Before – After a chiropractic intervention study of cerebral circulation discovered migraine headache patients exhibited an increase in intracranial compliance index (ICCI), following an atlas correction using the protocol established by the National Upper Cervical Chiropractic Association (NUCCA).
- Subject is one of eleven from an observational pilot study, exhibited unexpected decrease in ICCI instead of an expected increase.

METHODS

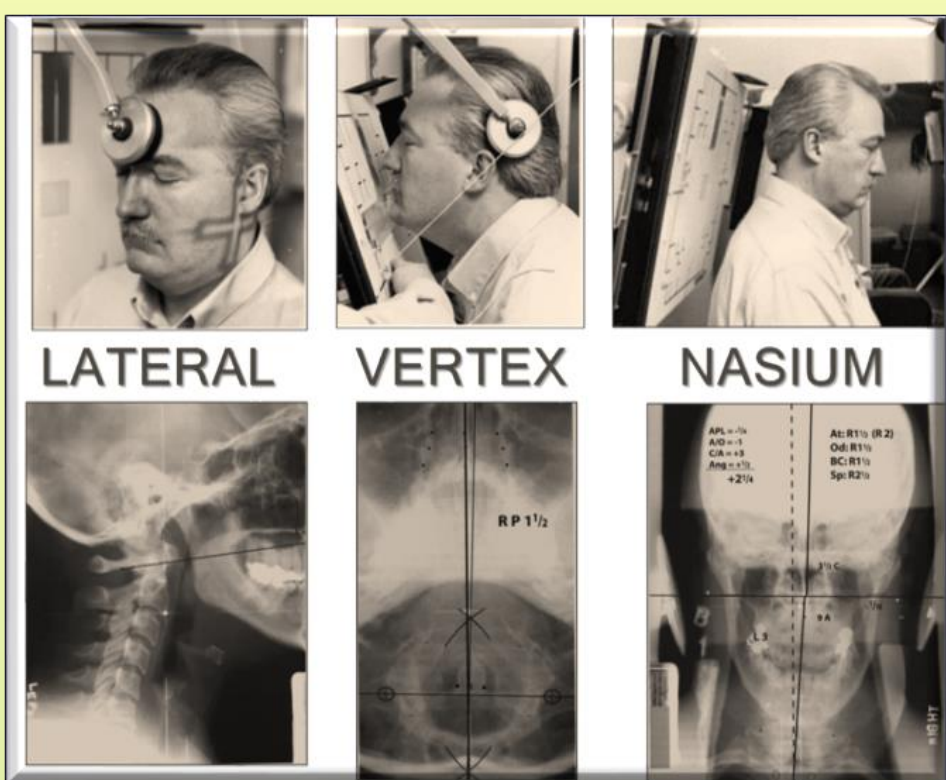
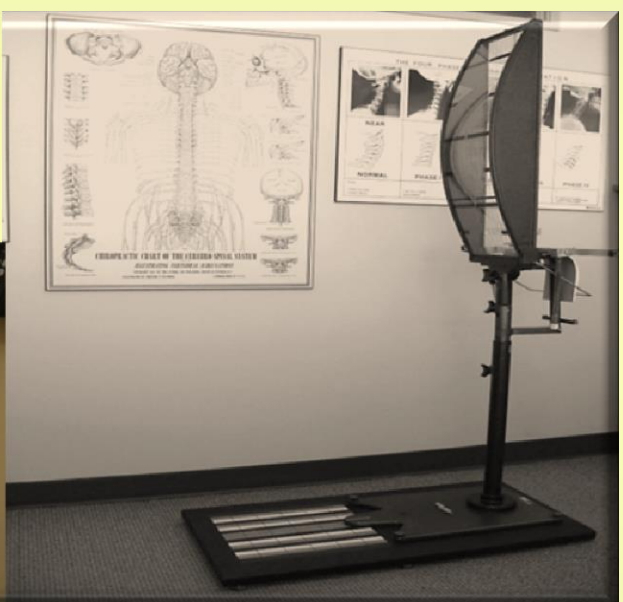
- **Primary Outcome:** Phase Contrast - MRI measured changes in ICCI from baseline to week-four, at week-eight, following NUCCA intervention,
- Subject recruited through neurology-based specialist referral clinic,
- Signed consent form, completed baseline migraine-specific outcomes; examined by neurologist,
- Presence of atlas misalignment indicated inclusion, allowing baseline PC-MRI,
- Subject received NUCCA care for eight weeks.
- Follow-up imaging & migraine specific outcomes occurred at week-four and week-eight,
- Neurologist exit interview allowed for final outcomes collection.

NUCCA Procedure By Board Certified Doctor



Supine Leg Check Screen
for Atlas Misalignment

Postural Assessment ➤ Gravity Stress Analyzer



Orthogonal Radiographic Exam

- before & after intervention
- Total Radiation Exposure = 468 mrem

NUCCA Correction



- Post x-ray determines atlas position has been restored to a 'normal' orthogonal alignment in frontal & transverse planes.

RESULTS

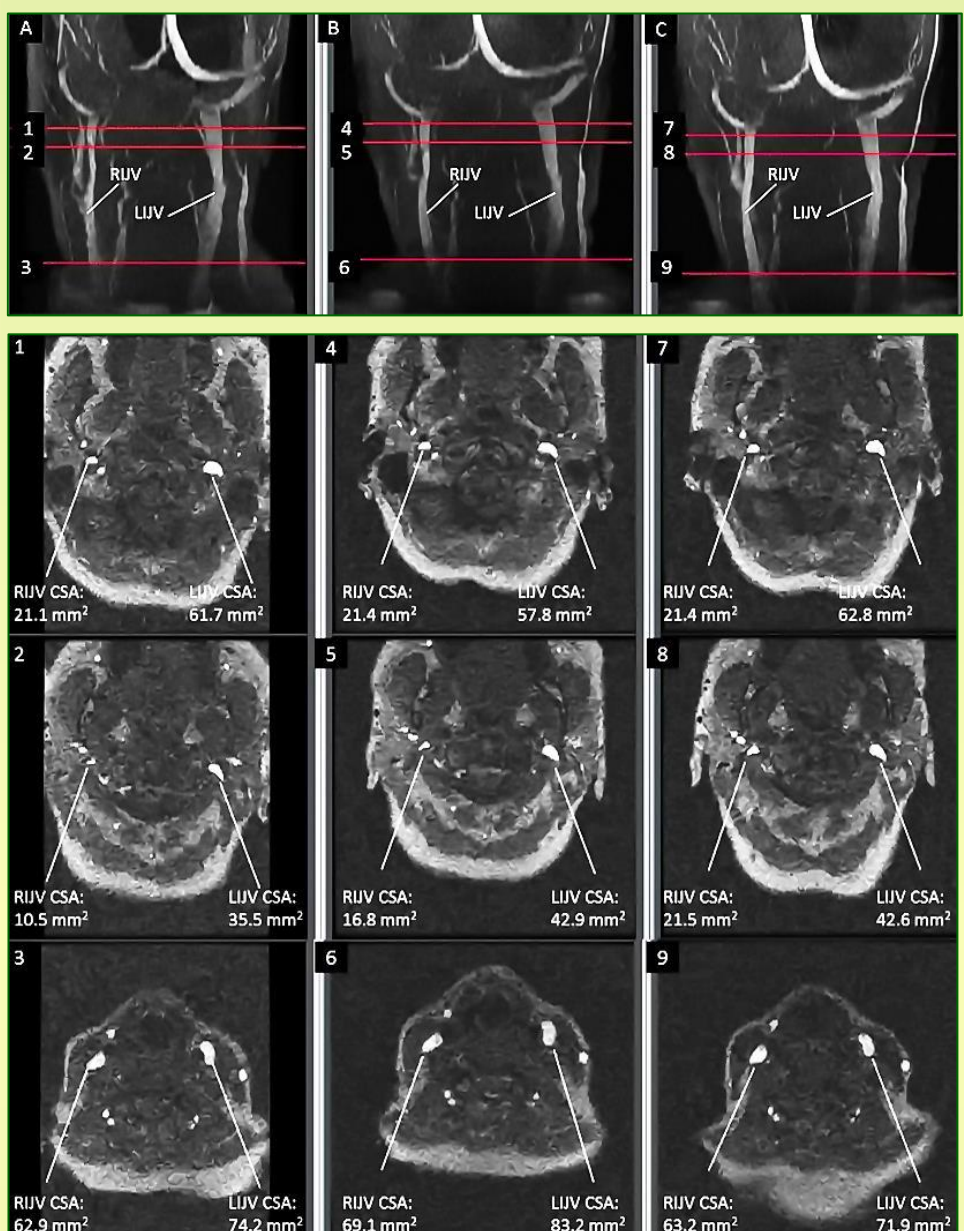
MRI Assessment	Baseline	Week-Four	Week-Eight
Pulse	62	62	63
Blood pressure	98\78	104\70	100\74
tCBF (mL/min)	631.4	576.4	646.0
LIJV (mL/min)	221.9	183.3	188.9
RIJV(mL/min)	381.8	382.0	331.4
ICVC (mL)	0.24	0.19	0.195
ICCI	5.04	4.46	3.87

Patient Reported Outcomes	Baseline	Week-Four	Week-Eight
MSQL-R	42.9	77.1	80.0
MSQL-P	75.0	85.0	100
MSQL-E	73.3	80.0	93.3
Patient Reported Outcomes	Baseline	Week-Twelve	
MIDAS	85.0		19.0
MIDAS-F	30.0		14.0
MIDAS-I	6.5		4.0
VAS	6.8		3.8

Abbreviations:

tCBF: total Cerebral Blood flow (mL/min)
LIJV: Left Internal Jugular Vein (mL/min)
RIJV: Right Internal Jugular Vein (mL/min)
ICVC: Intracranial volume change over one cardiac cycle (mL)
ICCI: Intracranial Compliance Index
HIT-6: Headache Impact Test–6
MSQL–E: Migraine-Specific Quality of Life Measure-Emotional
MSQL–P: Migraine-Specific Quality of Life Measure-Physical
MSQL–R: Migraine-Specific Quality of Life Measure-Restrictive
MIDAS: Migraine Disability Assessment Scale
MIDAS-F: Migraine Disability Assessment Scale-Frequency
MIDAS-I: Migraine Disability Assessment Scale-Intensity

Time of Flight MR Venogram of Internal Jugular Veins



Normalized IJV flow at C2/C3 [IJV flow/(ICA flow + VA flow)]

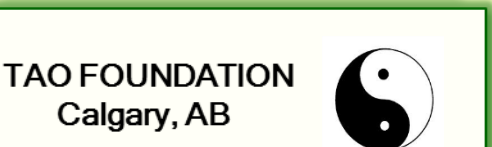
- 93% at baseline,
- 86% at week-four,
- 86% at week-eight.

Legend:

A-C: Coronal 2D TOF MRV MIP
1-9: Axial 2D TOF 1-3: Baseline
4-6: Week-four 7-9: Week-eight

CONCLUSION

- ICCI expected to increase, but decreased -HOWEVER-
- Subject reported great improvement in migraine headache symptoms
- Significant improvement in migraine-specific patient reported outcomes
- Improvement may be related to decrease in CSF Outflow Resistance at C-2,
 - Baseline = 2.83
 - Week Eight = 2.60



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