Effectiveness of osteopathic approach in preventing and treating neuro-vegetative dystonia with abnormal biomechanics of the cervical spine.

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The basics and medical terms which refer to vegetative dystonia historically have made a long way. At first (in the 50-s of the XX century) US Cardiologists Association introduced the term “neurocirculatory asthenia“ which included many major clinical manifestations and disturbances including, shortness of breath, labored breathing, heart rhythm disorders (palpitation) cardialgia and increased excitability, feeling of anxiety, CNS discomfort and weakness, diminishing physical abilities that occurs without visible cause. On the other side, the German school came with another term - "neurocirculatory asthenia," which is characterized by the presence of dystonia CNS structures with the advent functional disorders in the cardiovascular system without neurotic manifestations. Furthermore, at the beginning of the twentieth century Russia attributed great importance to psycho-emotional disorders therefore the term "cardiac neurosis “appeared. Since 1910, with the development of the concepts of sympathicotonia and vagotonia appeared term "vegetative-vascular dystonia". This term has survived until today.

Neurovegetative dystonia is an imbalance of sympathetic and parasympathetic nervous system. Moreover, it is directly related to biomechanical disorders of the cervical spine associated with muscular-fascial trigger-ligament syndrome supported by the neuro-vegetative complex with onset of the cervical sympathetic syndrome involving sympathetic nerves around the vertebral artery and compression of the nerves vag X and jugulars vein by crossing occipital-cervical region (OAA-foramen jugulars).

Vegetative dystonia or somatic vegetative dysfunction (SVD) is a disorder of functions and senses of the body, while organic and medically explanation of reasons for this disorder is not yet found. Patients have the symptoms similar to physical illness (such as wheezing, chest pain, sweating and dizziness, tremulousness, insomnia) however during clinical investigations it is impossible to determine the physical cause of the symptoms.

Vegetative – Vascular dystonia (VVD) and neuro-circulatory dysfunction is the pathological state of the autonomic nervous system which results in the insufficient supply of oxygen to human tissues and organs.

According to doctors findings about 80% of individuals of all ages have one or more signs of VSD

Depending on violations of cardio – vascular system:

Hypertensive type or vegetative – vascular dystonia of hypertensive type, accompanied by a significant rise in blood pressure (145/90 – 175/95 mm Hg. c.), sometimes with heart palpitations, sudden excitement, fever, symptoms of panic attack. In this context the pressure can be increased not only in times of emotional stress but also in a state of complete rest;

Hypotensive type or vegetative – vascular dystonia hypotonic type. In this case, the blood pressure is substantially lower than normal and reaches 100/50 and even up to 90/45 mm Hg. Art. and is accompanied by lethargy, weakness, shortness of breath, nausea, sweating, fatigue patient, sometimes fainting;

Normotensive or heart (cardiac) does not depend on the type of blood pressure and heart disorders defined by the (slow heart rate, or, conversely, rapid, feelings fade and disruptions of the heart) as well as pain in the chest area;

Mixed type of VSD combines multiple symptoms and signs typical for any type.

Depending on the cause of vegetative – vascular dystonia, the following types of VSD need to be considered:genetic, infectious – allergic, traumatic, psychogenic (as a reaction to stress or traumatic situations), appear as a result of excessive emotional or physical stress.

Traumatic VSD is directly related to biomechanical disorders of the cervical spine associated with muscular-fascial trigger-ligament syndrome supported by the neuro-vegetative complex with onset of the cervical sympathetic syndrome involving sympathetic nerves around the vertebral artery and compression of the nerves vag X and jugulars vein by crossing occipital-cervical region (OAA-foramen jugulars). The presence of a brain injury or developmental abnormalities (Kimerli, platibazia) may cause disruption of brain circulation and installation of the neuro-vegetative dystonia Stijakov L. (2004).

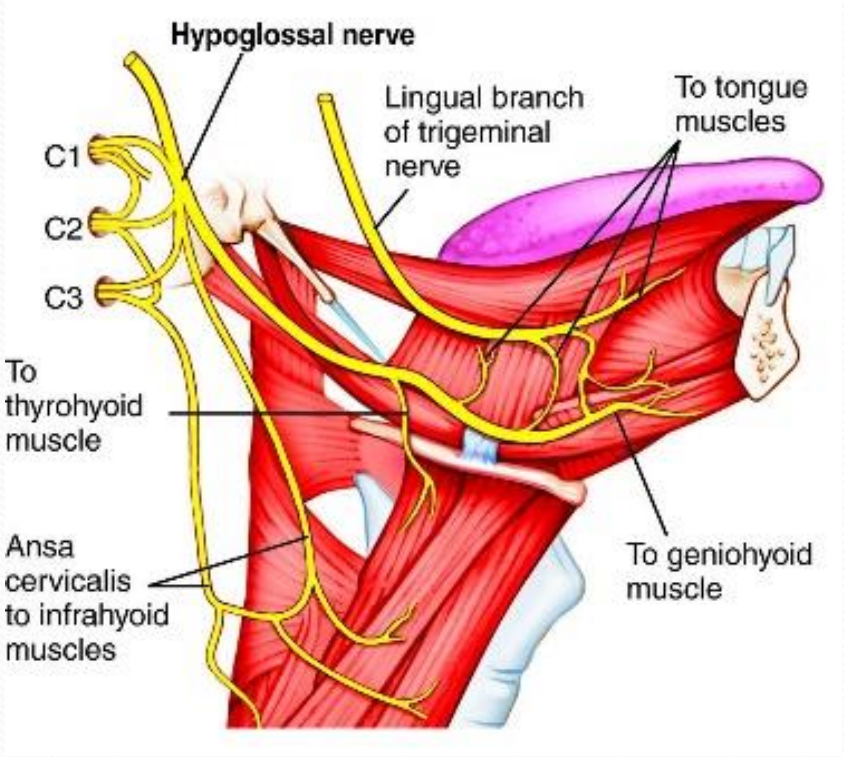
It is alarming that neuro vegetative dystonia holds first place in the structure of neurological noninfectious origin morbidity in children and adolescents with a frequency of 4.8% to 29.1% Felicia B. Axelrod (2008).

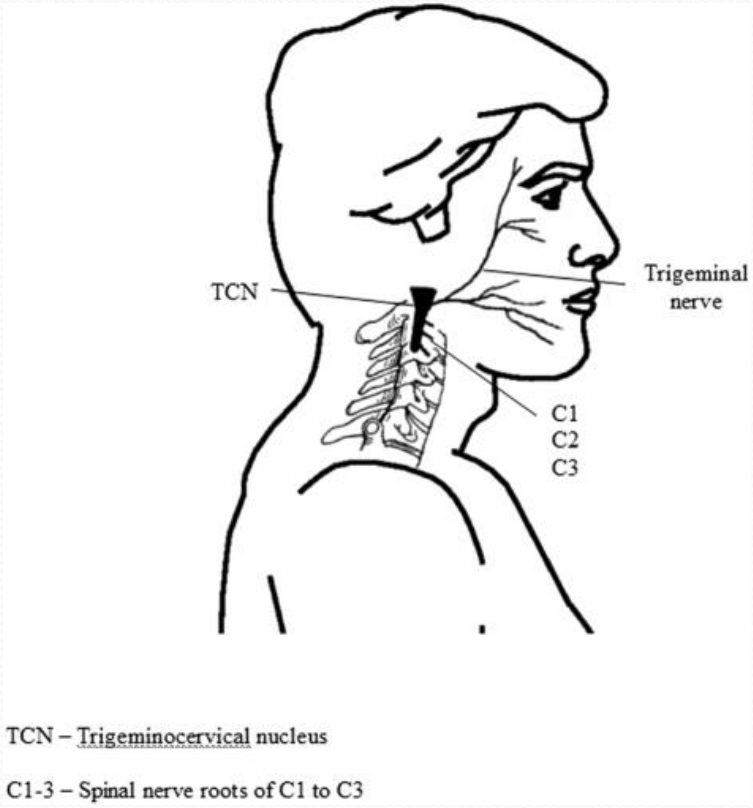
Headache is the most prevalent pain disorder in vegetative – vascular dystonia.

Kerr, supported by Western authors and coauthors, in1961 presented the downward convergence of nerve fibers of the trigeminal caudate nucleus and the first three cervical nerves (C1, C2 , C3) to the posterior horns , intermediary and the ventral spinal cord. (Figure 1)

Столозубенко Л.Г and Herman D believed that innervation of brain vessels by autonomic nervous system and somatic has an important role in the pathogenesis of cervicogenic headache.

The innervation of brain vessels is ensured by cervical superior nerves roots and cervical sympathetic ganglia (Figure 2) thus the cervicogenic headache will develop a typical pattern depending which innervation of cerebral vessels is involved in the pathological process. Moreover, clinical forms of cervicogenic headache are linked to the excitation of cervical nerve structures somatic or autonomic.

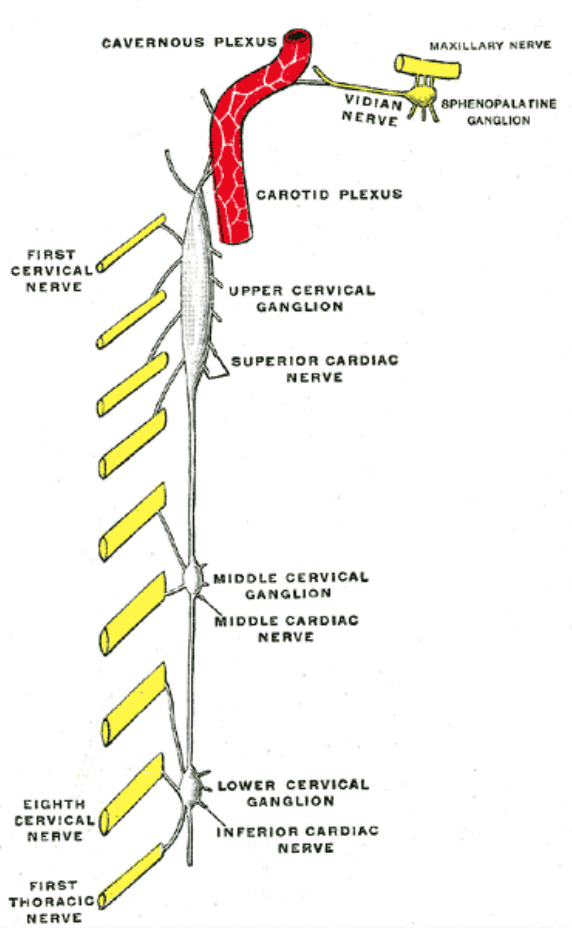




TCN – Trigeminocervical nucleus

C1-3 – Spinal nerve roots of C1 to C3

Figure 1


CAVERNOUS PLEXUS
MAXILLARY NERVE
VIDIAN NERVE
SPHENOPALATINE GANGLION
CAROTID PLEXUS
FIRST CERVICAL NERVE
UPPER CERVICAL GANGLION
SUPERIOR CARDIAC NERVE
MIDDLE CERVICAL GANGLION
MIDDLE CARDIAC NERVE
LOWER CERVICAL GANGLION
EIGHTH CERVICAL NERVE
INFERIOR CARDIAC NERVE
FIRST THORACIC NERVE

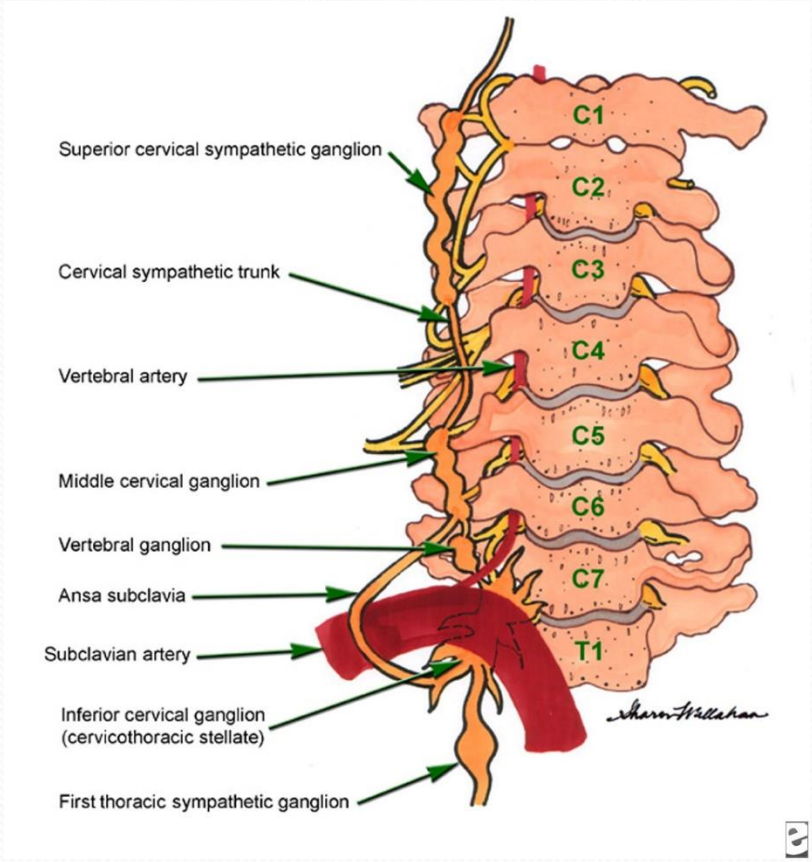
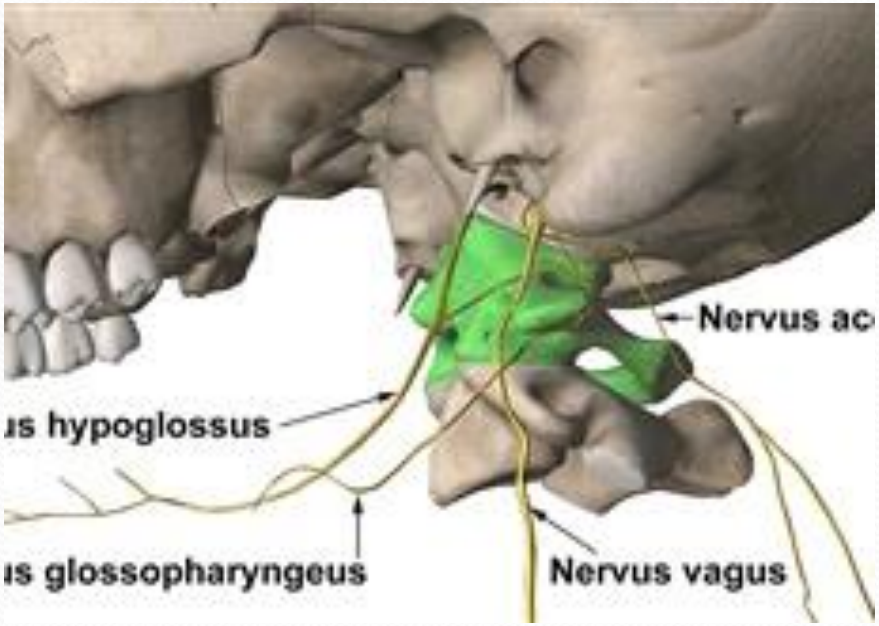

Superior cervical sympathetic ganglion
Cervical sympathetic trunk
Vertebral artery
Middle cervical ganglion
Vertebral ganglion
Ansa subclavia
Subclavian artery
Inferior cervical ganglion (cervicothoracic stellate)
First thoracic sympathetic ganglion
C1
C2
C3
C4
C5
C6
C7
T1

Figure 2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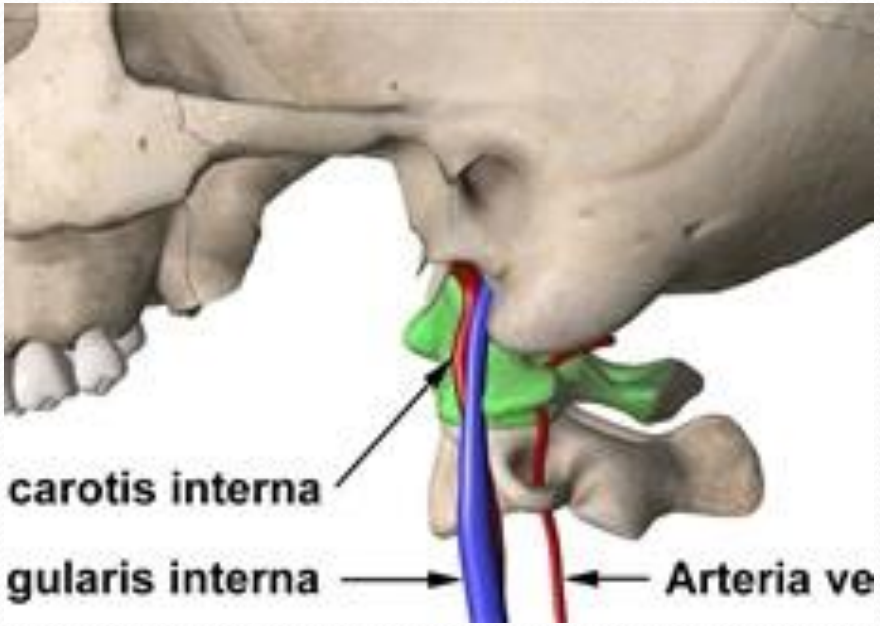
us hypoglossus
us glossopharyngeus
Nervus vagus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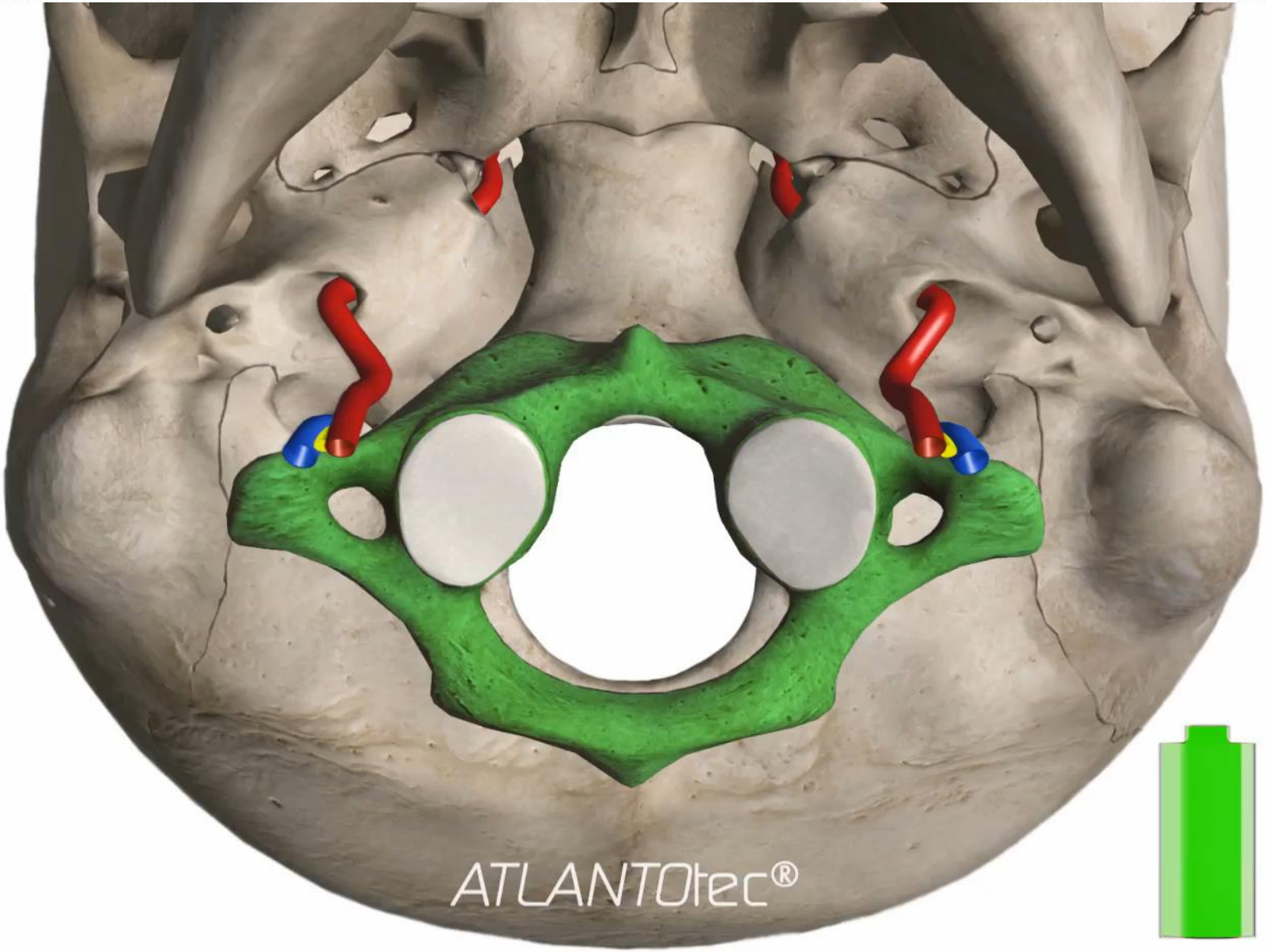
gularis interna
Arteria ve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Patients, who come to our clinic with the request to cure them of vegetative-vascular dystonia usually complained of:

- excessive fatigability
- instability of emotional condition
- tachycardia
- discomfort in the area of thorax
- disturbances in work of heart
- stomach and intestine problems
- excessive sweating
- attacks of dyspnea
- paresthesia or “creeping sensation”
- increase of temperature
- lump in throat feeling
- numbness of extremities
- depression of motivation
- weather sensitivity
- headaches

One of the common diagnostic challenges is to distinguish headache originating among the pain sensitive structures of the neck cervicogenic headache (CGH) from other headache forms. Studies have shown that an incorrect headache diagnosis may occur in more than 50% of cases.

The CGH International Study Group considers restricted range of motion of the neck to be one of the major diagnostic criteria for CGH. Manual examination has high sensitivity and specificity to detect the presence or absence of cervical joint dysfunction in neck pain and headache patients. Moreover, Zito determined that the presence of upper cervical joint dysfunction measured by manual examination, in comparison to measures of posture, range of motion, cervical kinesthesia, and craniocervical -muscle function, most clearly identified CGH sufferers **.**

However, these tests require a high degree of skill on the part of the therapist, and their reliability has been questioned. It has been suggested though that this may be a reflection of poor research methods rather than being an unreliable test

The cervical flexion-rotation test (FRT) is an objective method of determining upper cervical joint dysfunction that is showing promise in the identification of patients with CGH. The FRT(Figure 3) is a simplified form of manual examination developed to identify C1/2 dysfunction. In this test procedure, the cervical spine is fully flexed and should allow unrestricted motion at C1/2, which has a unique ability to rotate in any cervical posture. As movement at other cervical segments would be constrained by this end-range position, movement is isolated to the C1/2 segment. The cranio-cervical flexion test indirectly measures deep neck flexor function, while it is not possible to directly palpate the deep neck flexors, it is possible to palpate the superficial flexors muscles, which should be minimally active during this test. One of the key features that clinically identifies deep neck flexor dysfunction is increased superficial flexor muscle during the craniocervical - flexion test, in an attempt to gain range of motion.

Figure 3

The range of rotation in end-range flexion is normally 40–44° to each side. In contrast, subjects with C1/2 dysfunction have significantly less rotation. When administered by highly trained manual therapists, the FRT has high sensitivity (91%) and specificity (90%) in differentiating subjects with CGH from asymptomatic controls or subjects with migraine with aura. Data from the same study demonstrated that a range limited to 32° or less may be considered positive.

There is a variety of available non-invasive methods, such as visual estimations, the goniometer, the inclinometer, the potentiometer, compasses, videos and electromagnetic technologies.

The Cervical Range of Motion device (CROM figure 4) is a goniometer capable of measuring the ROM of flexion, extension, inclination and rotation of the cervical spine by three inclinometers. It has the advantage of recording in all planes without the need for anatomical markers and the repositioning of the device throughout the assessments.

Unlike other instruments, it is a method whose reliability is well established in the literature, since several studies have demonstrated ICC ranging from good to excellent. However, the CROM is less used because it is imported equipment with a very high cost.

Figure 4

Muscle dysfunction has also been identified as an important feature of CGH. It has been suggested that dysfunction may include loss of postural alignment and neuromuscular control as well as muscle weakness, endurance, and extensibility. A reflection of the importance of the muscle system to CGH is shown by the long-term improvement in headache symptoms as a result of exercise designed to retrain the muscle system in patients with CGH.

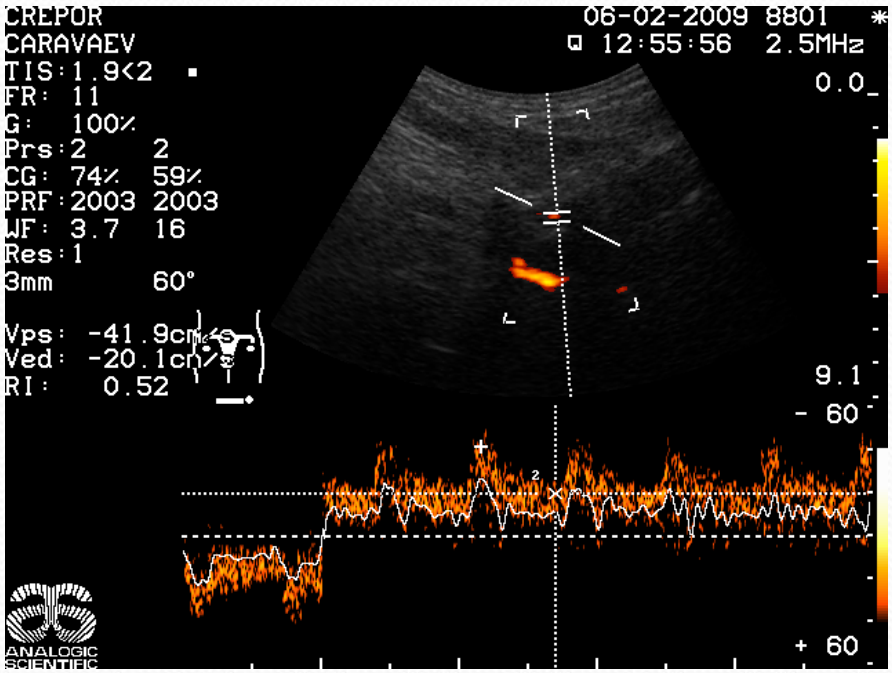
Posture is an indirect measure of the functional status of the neuromuscular system. While one early study found an association between forward head posture and CGH, which has been cited in the literature, this association has not been substantiated by more recent studies, and postural change is not a unique feature to sufferers of CGH.

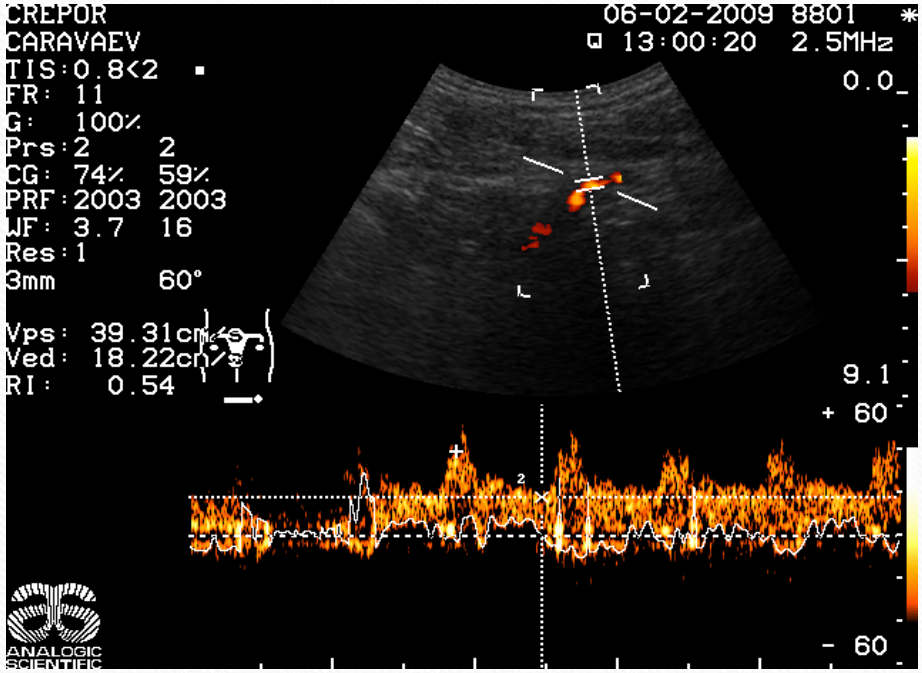
The cranio-cervical flexion test indirectly measures deep neck flexor function, and it has been shown to have good reliability. This test is performed in crook-lying, and it requires the patient to perform upper cervical flexion in five stages of increasing range, holding each position for up to 10 seconds. The range of upper cervical spine flexion has been shown using electromyography to be directly related to the activation of the deep neck flexors in asymptomatic controls.

Cervical Range of Motion Instrument measure:

- Sub-occipital flexion and extension
- Cervical flexion and extension
- Lateral flexion
- Cervical rotation
- Forward Head Position
- The cervical flexion-rotation (Dvorak test)

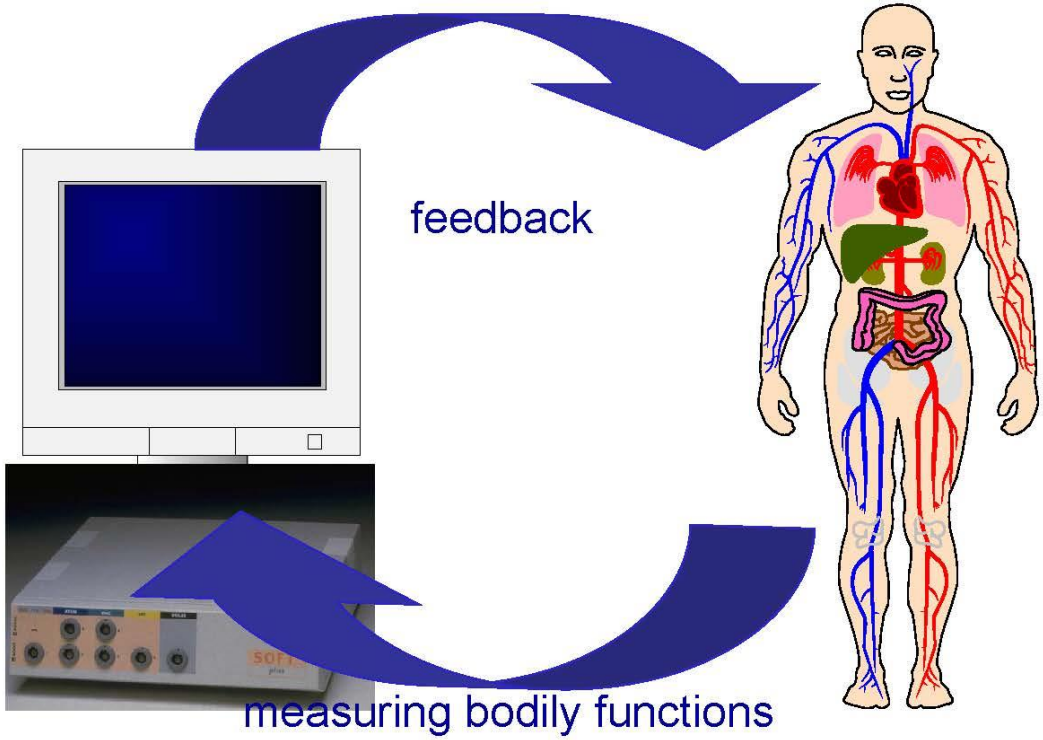
Circulatory disorders in vertebral arteries and basilar system were registered with transcranial Doppler ultrasonography (values of blood flow on vertebral arteries and veins and vascular resistance in vertebral arteries)





Digital Functional Rx was performed with functional test (flexion, extension and C0/C1/C2 region through mouth)

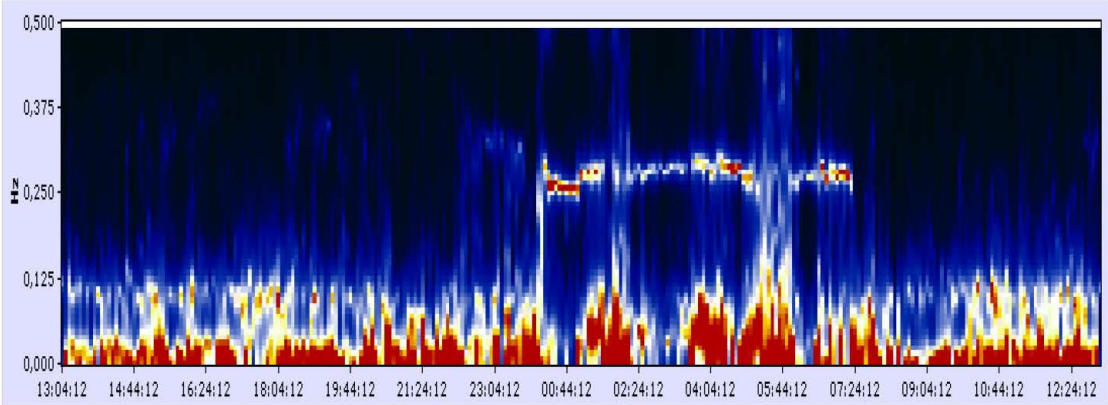
Biofeedback

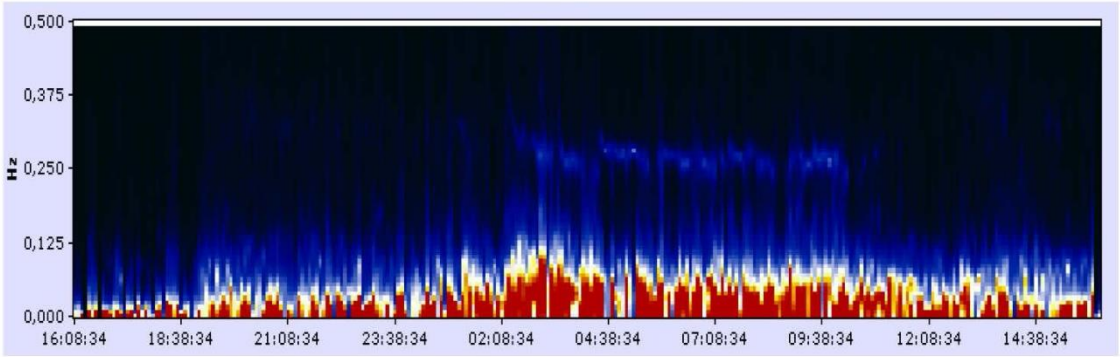


Heart rate variability (HRV)

Heart rate variability (HRV) indexes the beat-to-beat changes in heart rate that are normally controlled by membrane activity of the cardiac sinoatrial (SA) node (Burkholder, et al., 1992; Levy & Warner, 1994; Randall, 1994). This activity is modulated by neuronal input from both branches of the ANS: the parasympathetic terminals slow the rate of SA node depolarization (i.e., cell firing) via acetylcholine release onto muscarinic receptors, and sympathetic terminals accelerating the rate of SA node depolarization through the action of norepinephrine binding onto receptors which mediate a second messenger cascade of intercellular signalling (Burkholder, et al., 1992; Levy & Warner, 1994; Randall, 1994).

Autonomous heart-screening



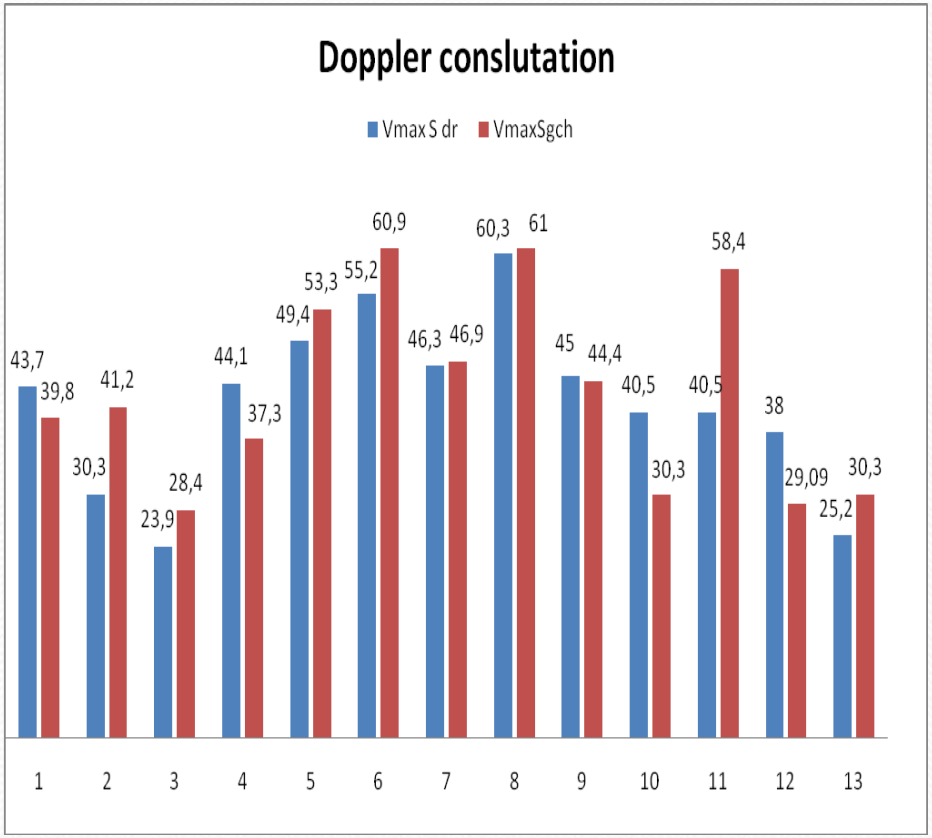


The treatment method involves improving joint mobility and reducing muscle tension resulting in improved blood supply and drainage from the head and reduced nerve irritation consisted on high velocity low amplitude technique of cervical superior region and upper thoracic region

Manipulation:	Co/C1	E/FSl Rr	E/F SdrRl
	C1	C1 rot R	C1rot L
	C2/C7	F/E SlRgl	F/E SrRr
	T1/T2	F/E SlRgl	F/E SrRr

Muscle Energie technique (in flexion, rotation, latéroflexion):

Myofascial Release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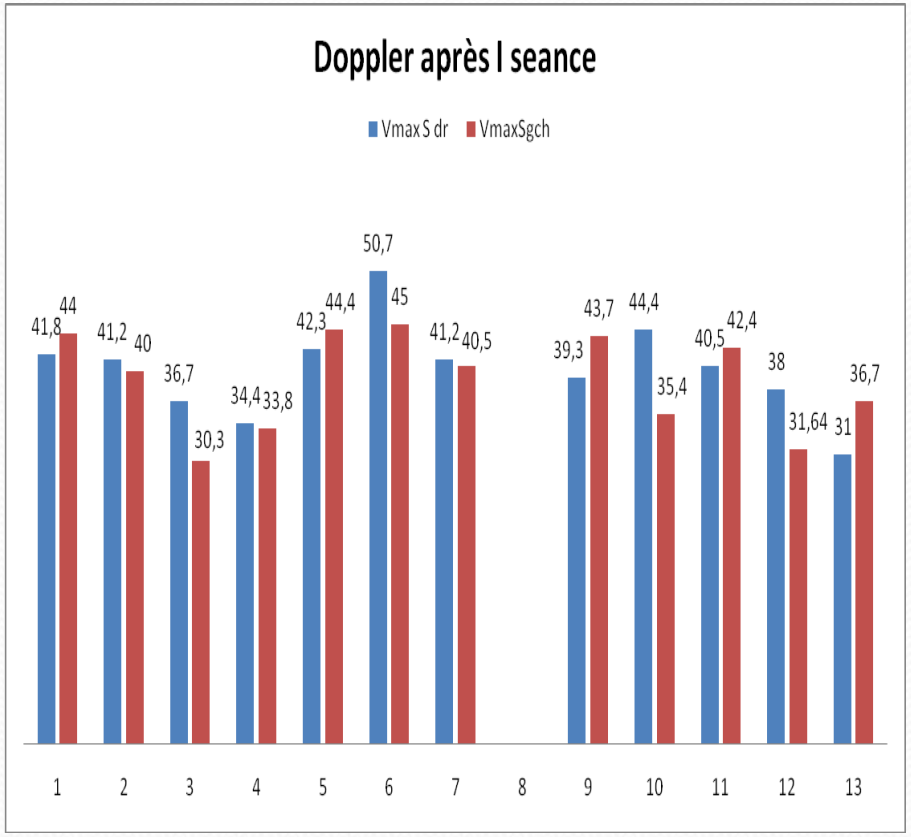
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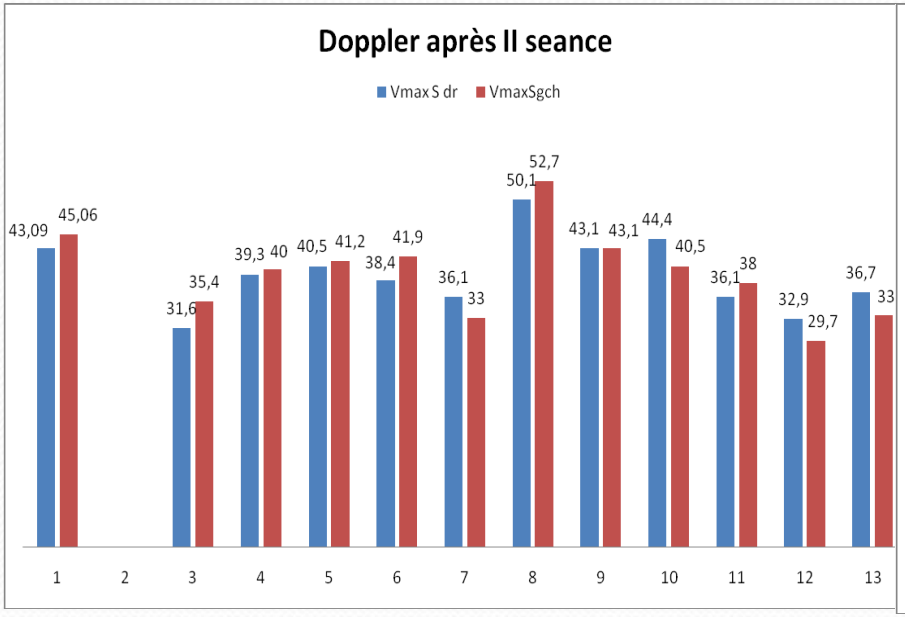
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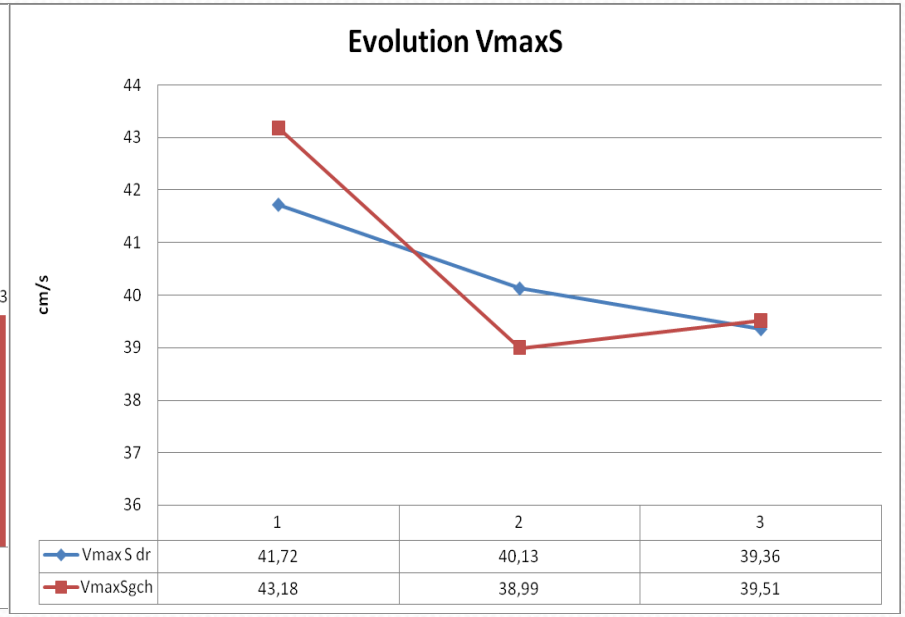
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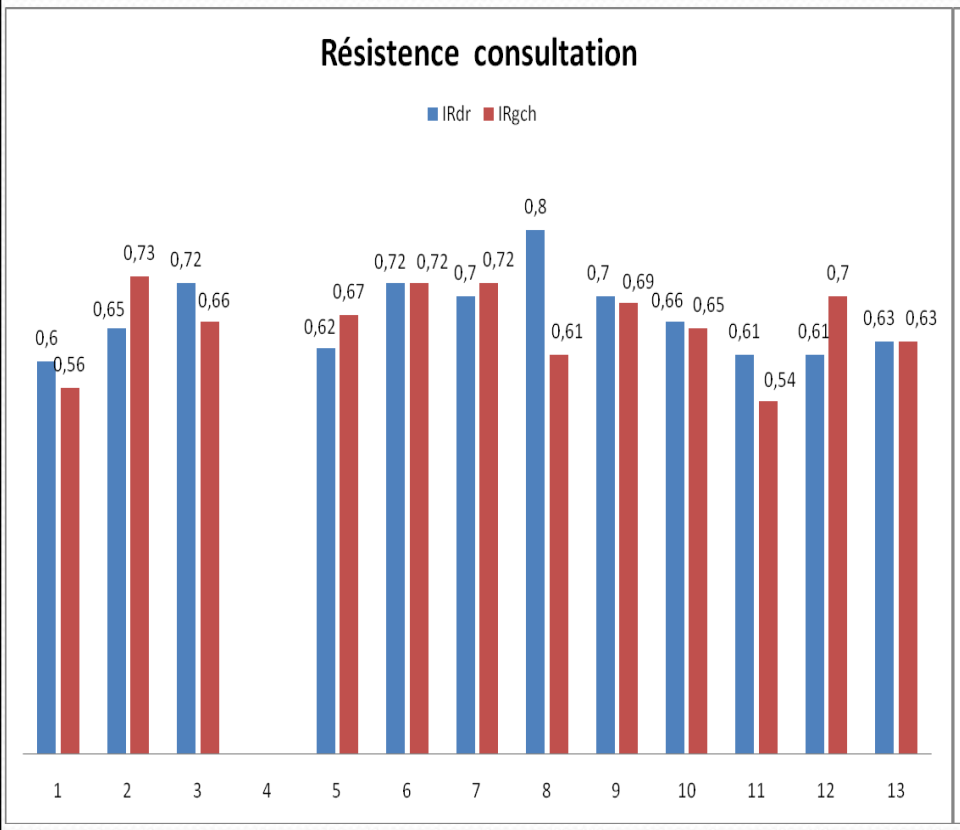
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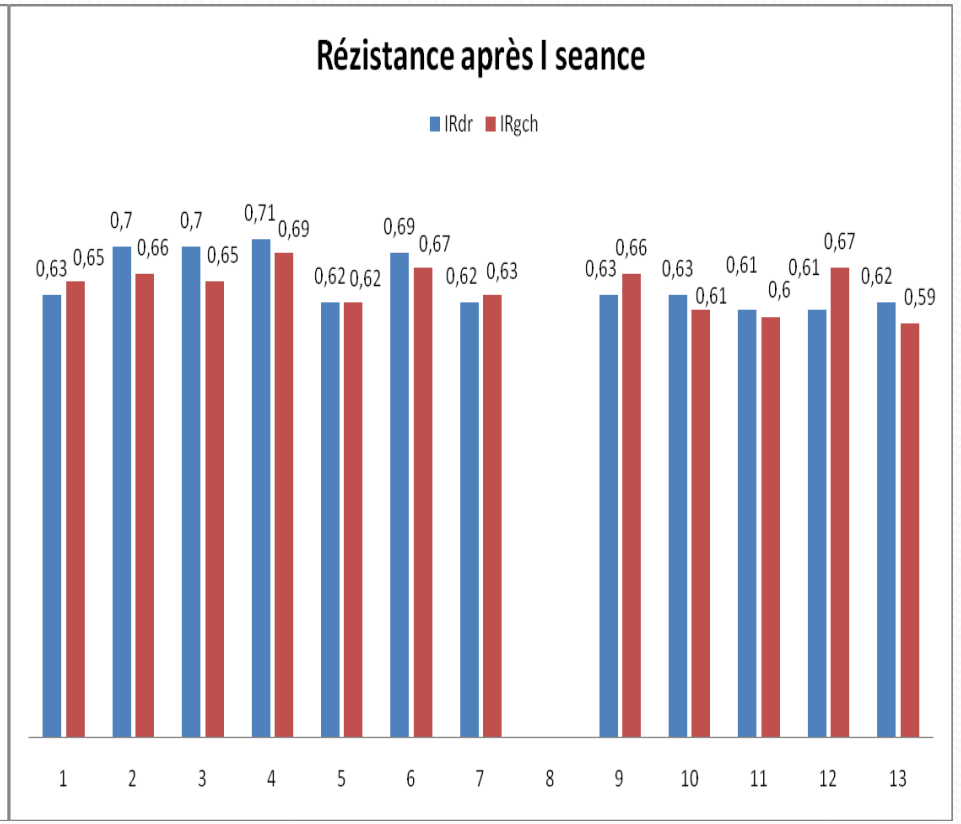
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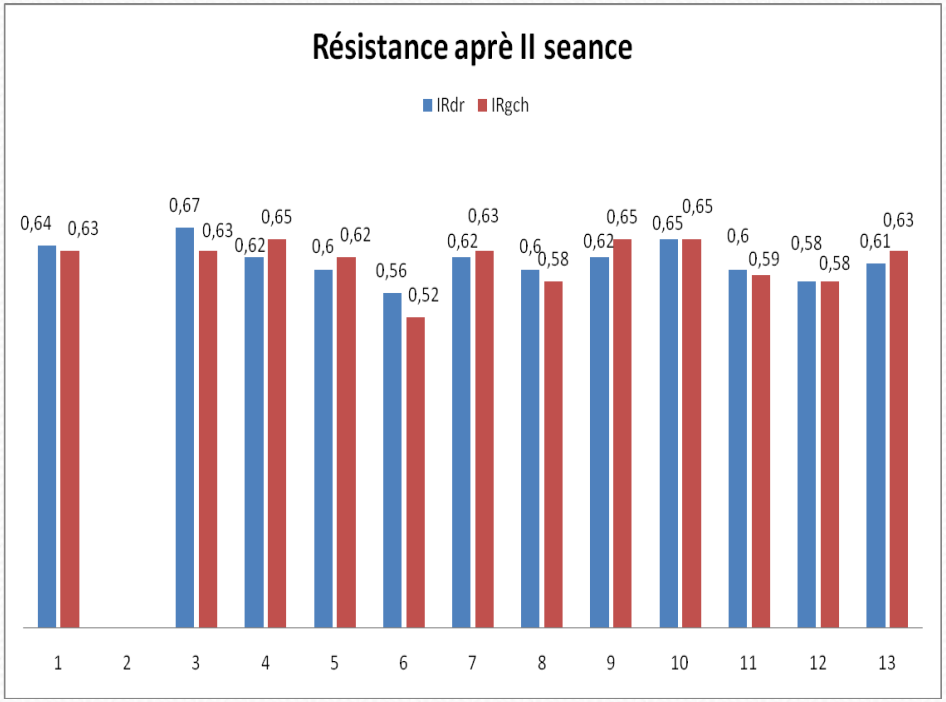
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Evolution de la résistance
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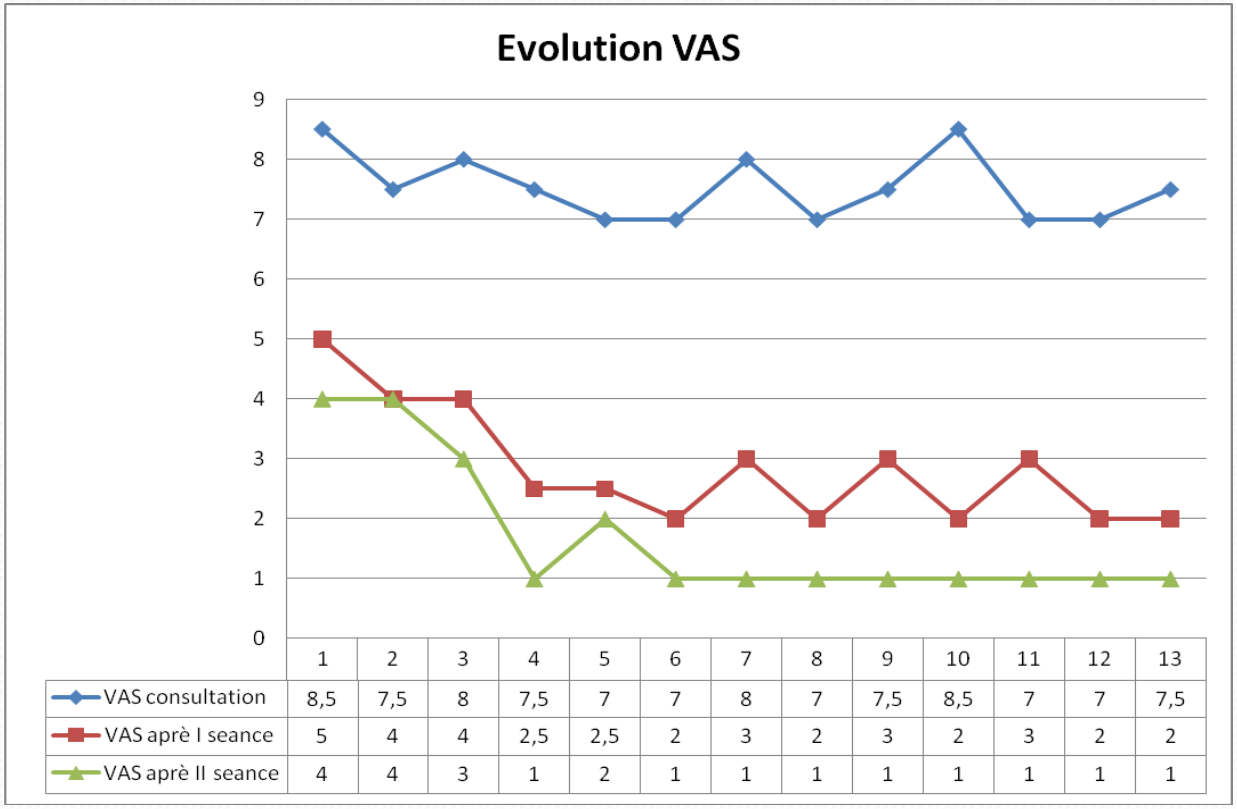

	1	2	3	4	5	6	7	8	9	10	11	12	13
VAS consultation	8,5	7,5	8	7,5	7	7	8	7	7,5	8,5	7	7	7,5
VAS aprè I seance	5	4	4	2,5	2,5	2	3	2	3	2	3	2	2
VAS aprè II seance	4	4	3	1	2	1	1	1	1	1	1	1	1

Conclusion: The overall findings indicated that participants experienced significant improvements in the symptoms, (wheezing, chest pain, sweating and dizziness, tremulousness, insomnia) in the mobility of cervical superior region measured by cranio-cervical flexion test, and in the clinical data (normalization of blood flow through vertebral artery and veins with decreasing of arterial resistance).

The results obtained in patients with neuro-vegetative dystonia show the effectiveness of the osteopathic approach in treatment and prophylaxis of the progressive autonomic disorders: cervicogenic headache, syncope, cardiovascular autonomic disorders, bouts of hyperventilation.

Thank you

Dank jewel