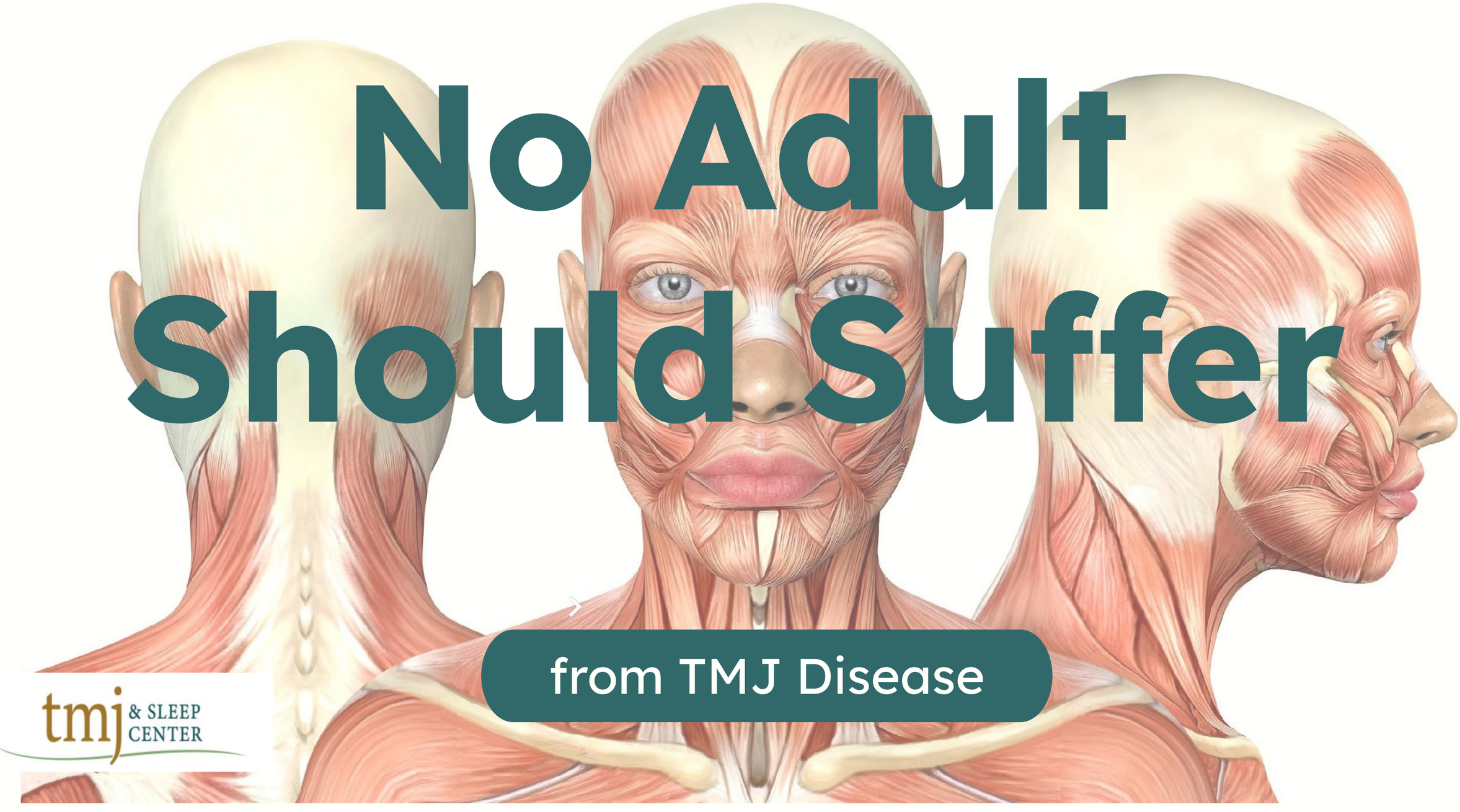
No Adult Should Suffer

from TMJ Disease

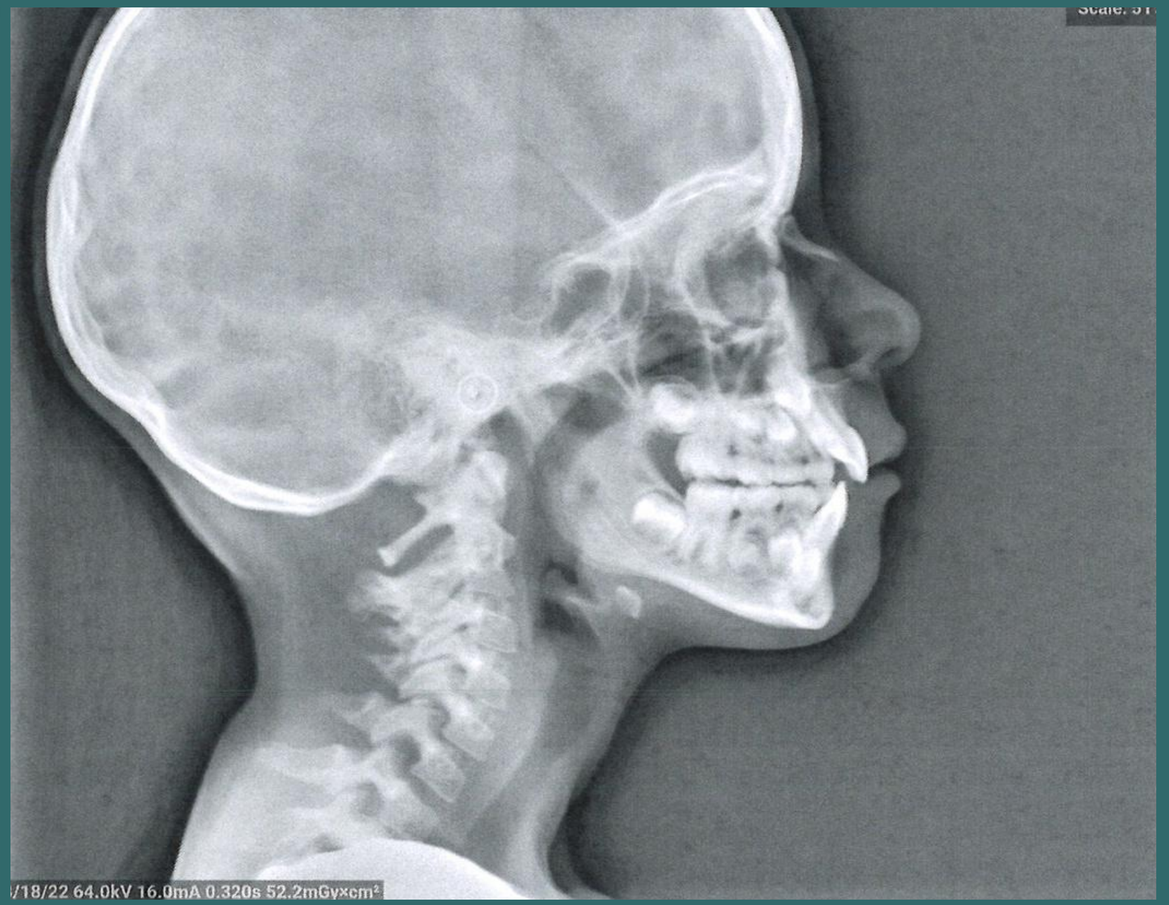


tmj & SLEEP CENTER

Age?

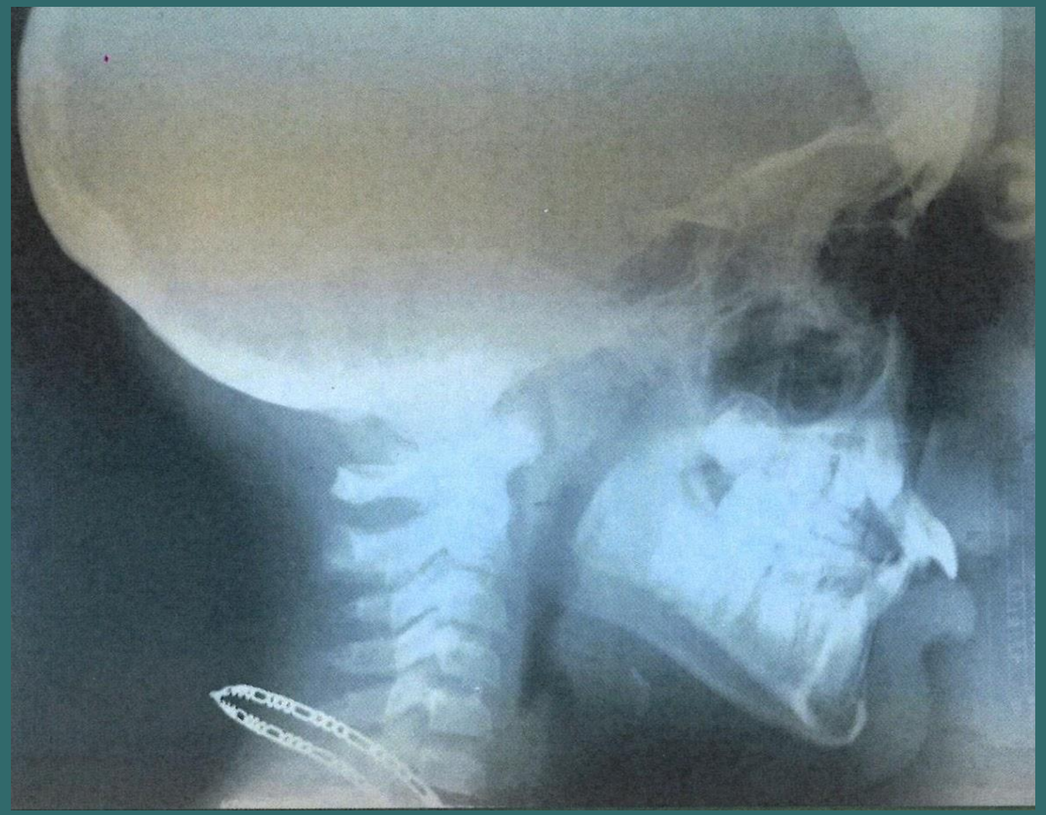
Before

After



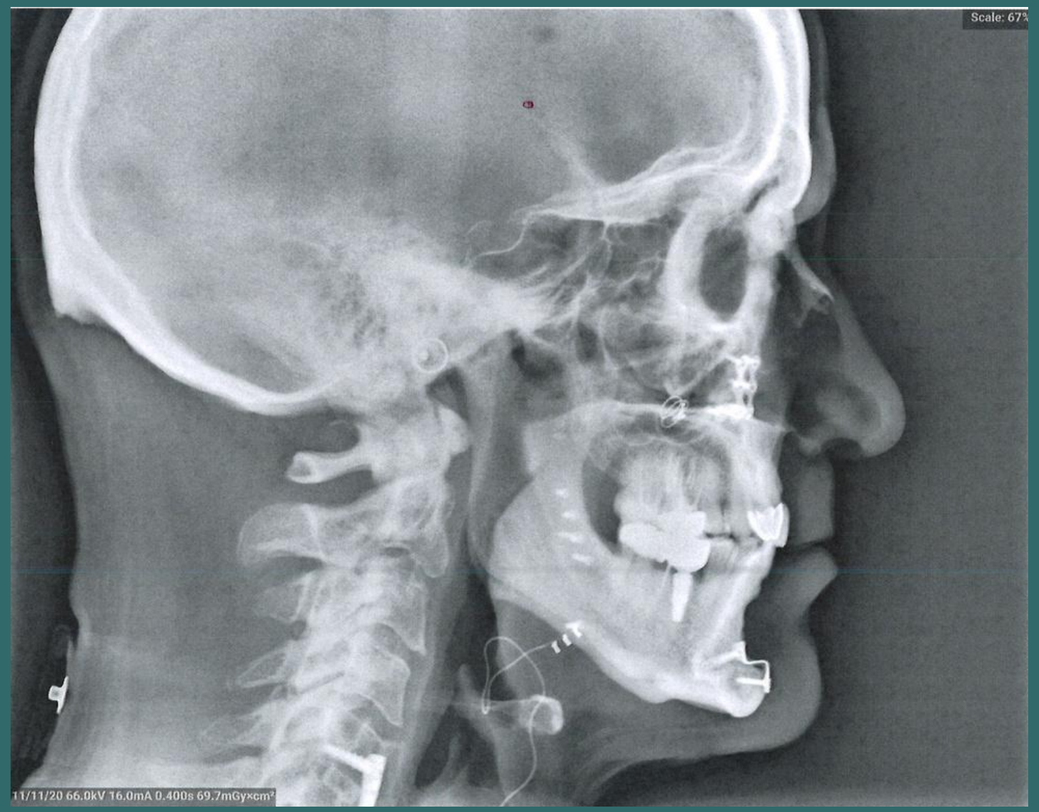
Before

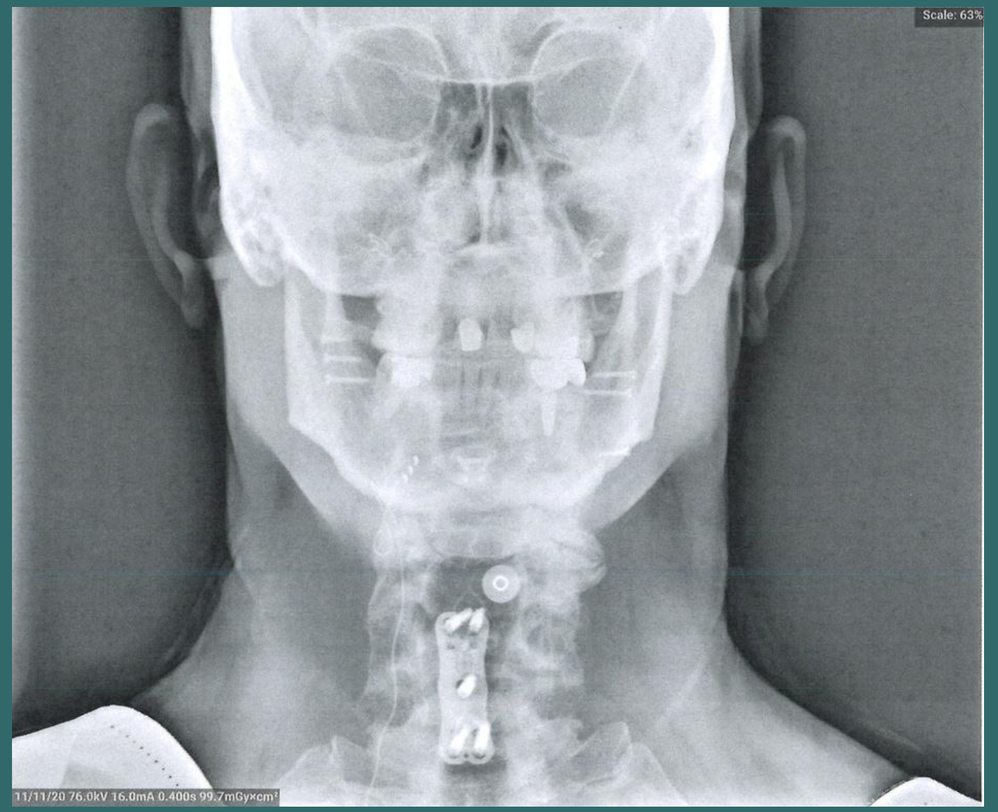
Before



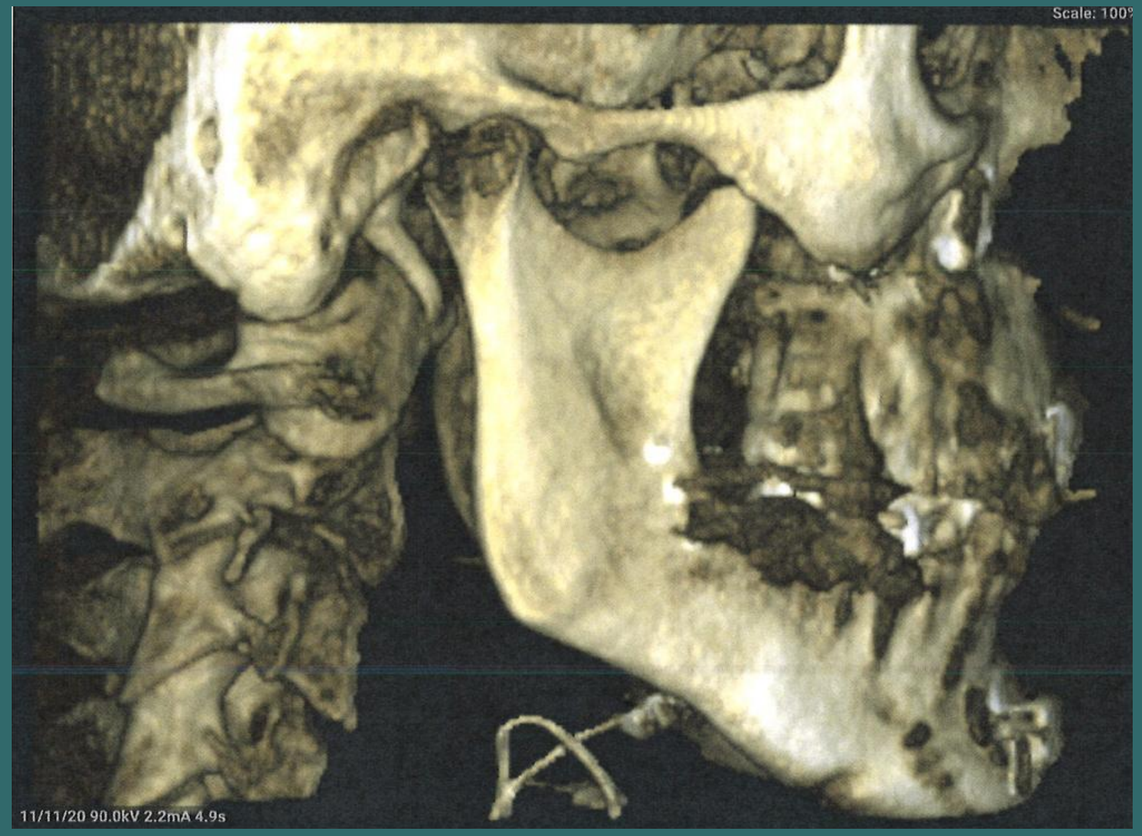
After

Chronic Pain - Why?





Chronic Pain - Why?



Dr. Paul A. Insolera

Education: B.S. Rutgers University

Doctor of Dental Surgery; New York University College of Dentistry

Memberships and Accolades

- Lifetime Member American Dental Association
- Wisconsin Dental Association Member
- Diplomat American Academy of Pain Management (Now the Academy of Integrative Pain Management)
- Fellow from the International College of Craniomandibular Orthopedics
- Member American Academy of Dental Sleep Medicine
- Member American Academy of Functional Orthodontics (now the International Association of Orthodontics)

All Bites Are TMJ Disease

Deep Bite

Crossbites

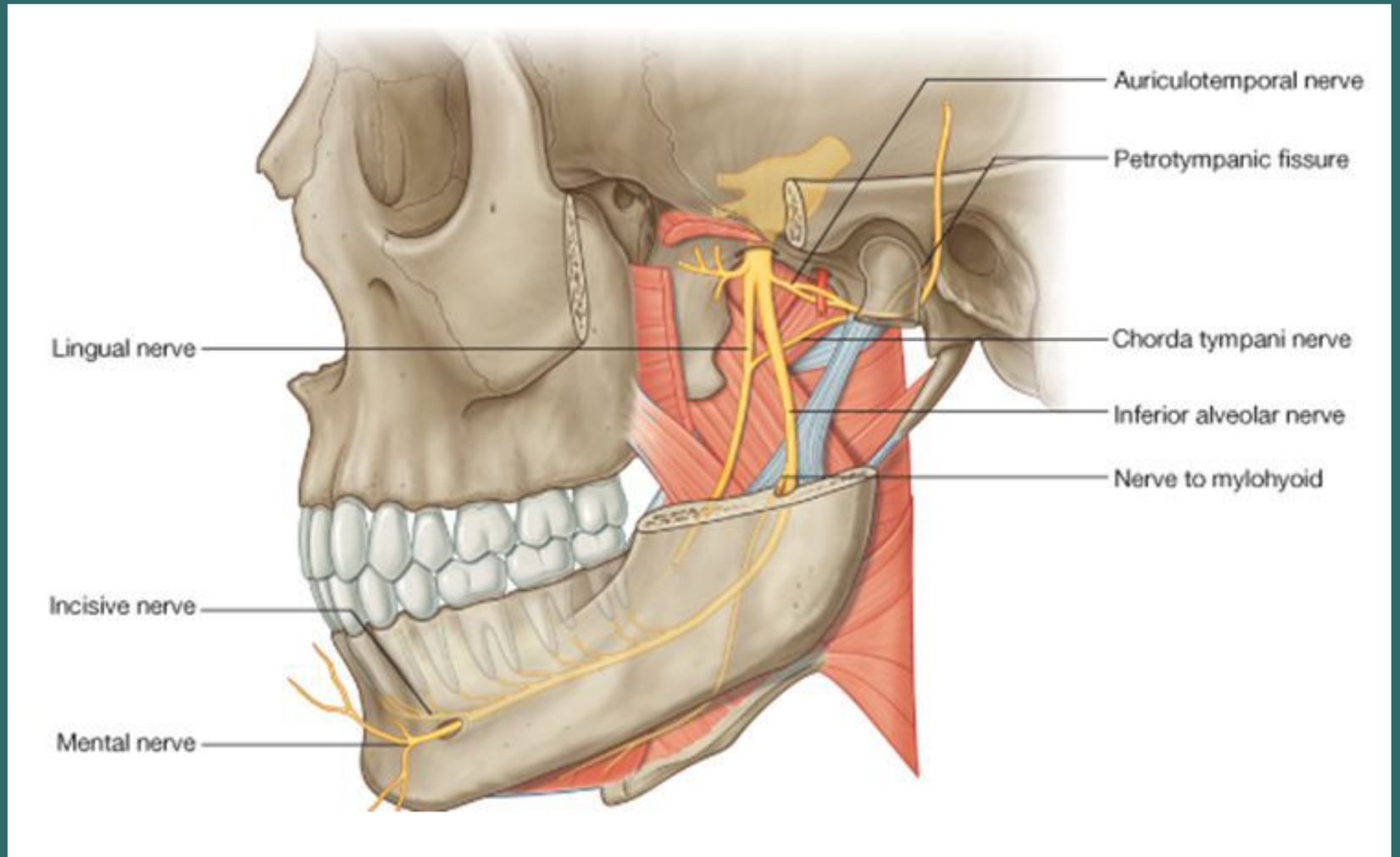
Overbites

Class II Div I and II

Class III

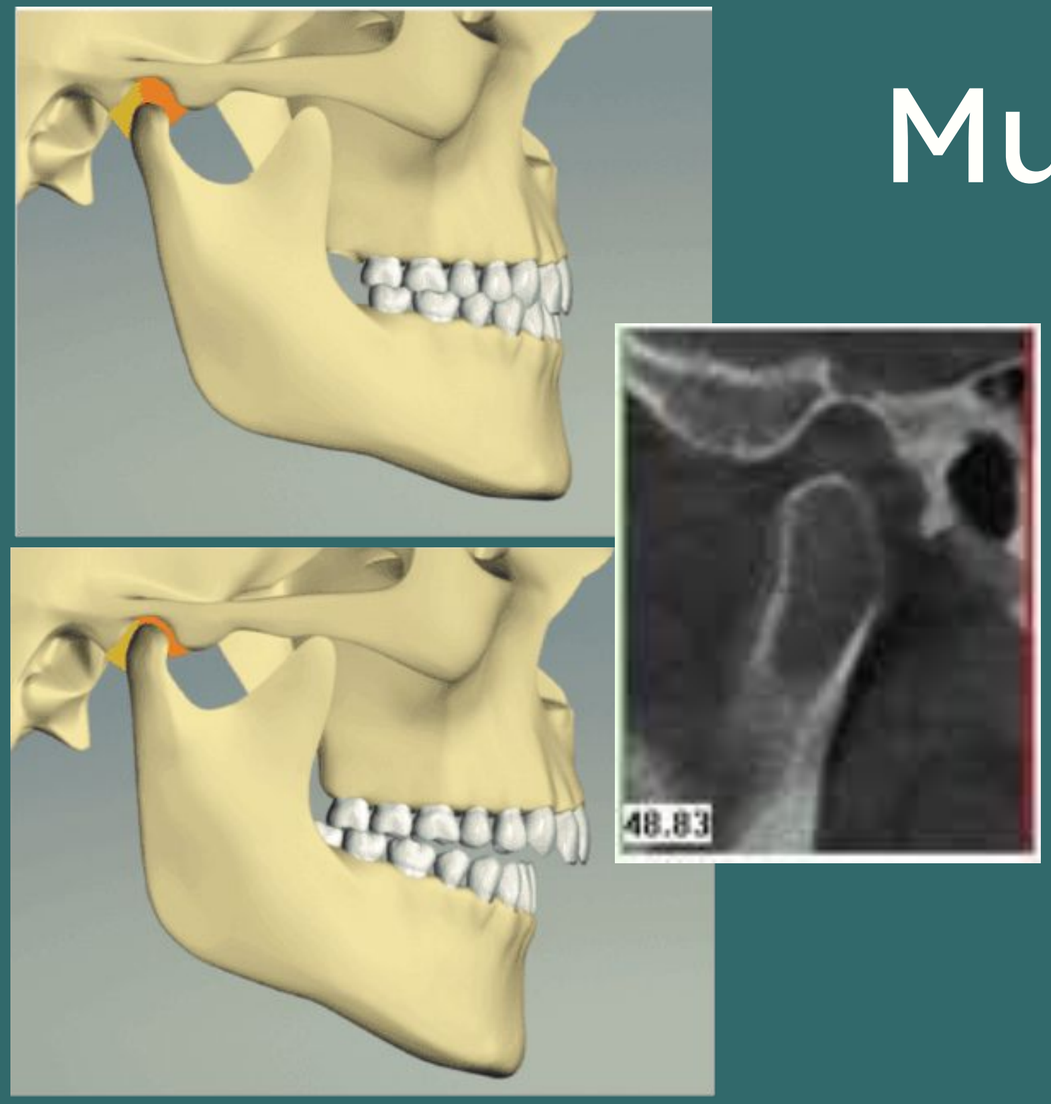
Meaning the condyles are superior/posterior in the joint capsule.

Intracapsular Pressure from Condyles on Joint Capsule



- Due to 6 year molar occlusion
- Creates spurring and lack of range of motion
- Condylar head posterior/ superior in joint
- Can “force” joint fluid into middle ear that is called an “infection” through petrotympanic fissure

Extracapsular Muscle Dysfunction



- Improper condylar position is caused by genetics
- Abnormal bite creates forward head position, leading to whole body muscle dysfunction
  - Lack of recruitment in masseters muscles (clench)
  - Gonial deposition from clenching
  - Curve of SPEE
  - Coronoid hyperplasia
- Continuous dysfunction from bite can lead to:
  - Headaches
  - Ear pain
  - Facial pain
  - Vertigo

Dysfunctional Bites Lead to

TMJ Disease

Proper awareness of bites is essential for early intervention.

Allowing children to habituate to a dysfunctional bite creates growing and postural problems.

Dysfunctional bites in children -> TMJ Disease in adults

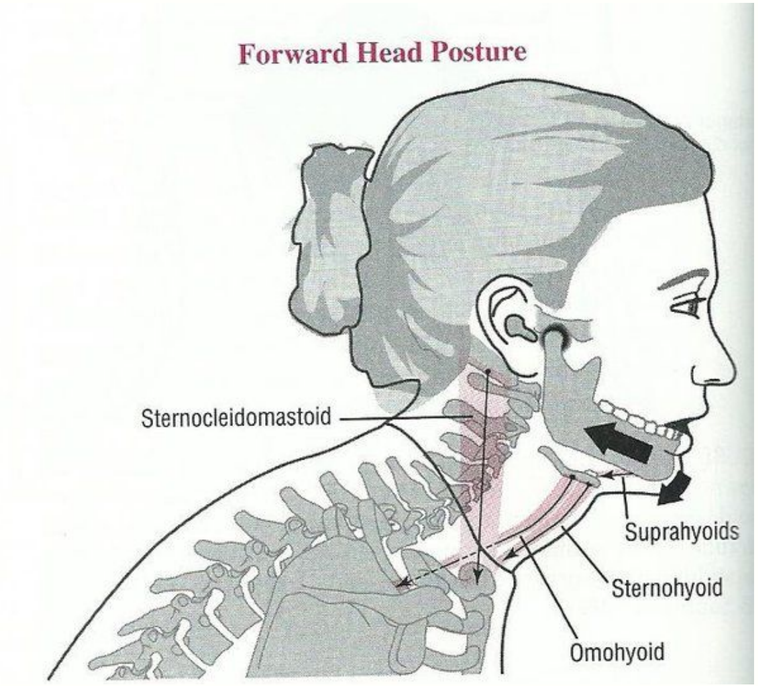
Did You Know?

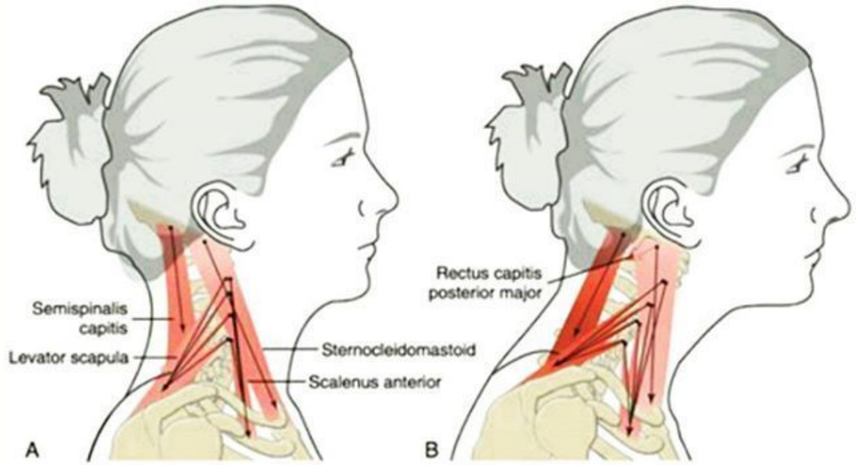
TMJ Disease Runs in Families

It begins developing at age 6!

Children "learn" to breath, swallow, chew, and speak to an improper jaw position.

Allows for the 15 lb. head to come <u>FORWARD.</u>





Genetic TMJ Disease

When 6 year molars occlude - they set condylar position

If not set properly, can cause:

- Deep bites (overbites, underbites)
- Retrusive/protrusive mandibles
- Forward head position
- Insufficient ROM (range of motion)

Panorex Use Can Reveal:

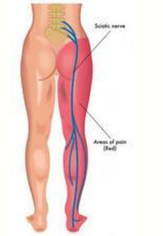
- High coronoids (attenuated) – temporalis imbalance
- Gonial deposition – masseter clench
- Not Diagnostic for condyles/position in fossae

Did You Know?

TMJ Disease can create spinal compression/muscle dysfunction long term, which can lead to:

Spinal Stenosis

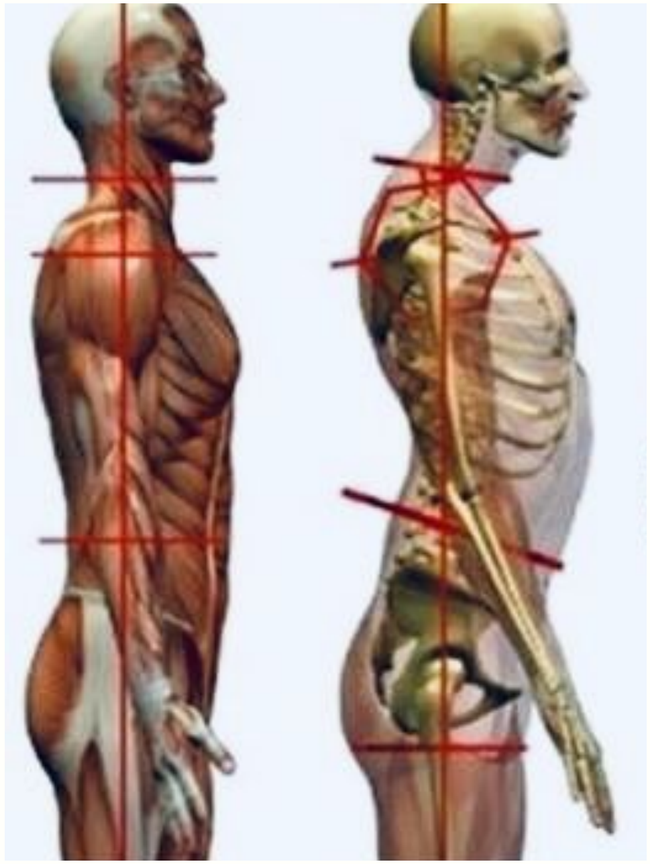
Osteoporosis



Sciatica

Osteoarthritis

TMJ Disease will create:



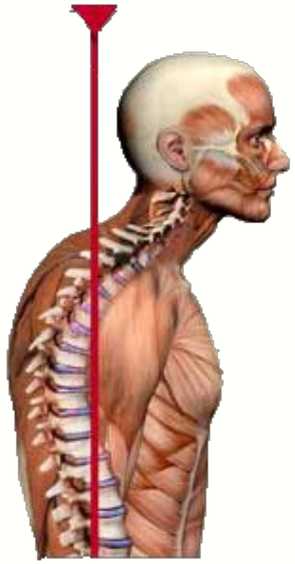
- Forward Head Posture (even in children)
  - Swallow dysfunction-breathing-GERD
  - Facial pain
  - Temporalis pain – temporal headaches
  - Pain behind eyes, condylar pain
- No Diaphramatic breathing
- Intrudes posterior teeth
- 3-Dimensional Intra-oral imbalance
- Condyles move posteriorly, superiorly

Did You Know?

12 lb. head

32 lb. head

42 lb. head

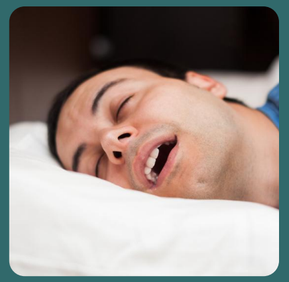


For every inch of Forward Head Posture, it can increase the weight of the head on the spine by an additional 10 lbs.

- Forward Head Position can create over 40 lbs. of pressure on the musculoskeletal system
- Longer head remains forward, more the spine is compressed AND muscles are shortened
- “Forward Head Posture (FHP) leads to long term muscle strain, disk herniation, arthritis, and pinched nerve.” – Mayo Clinical Health Letter, March 2000

Symptoms of TMJ Disorder

Headaches



Sleep apnea

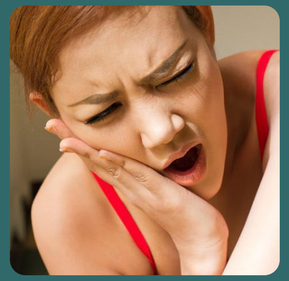
Vertigo

Popping jaw

Neck/facial pain

Numbness in hands

Low back pain

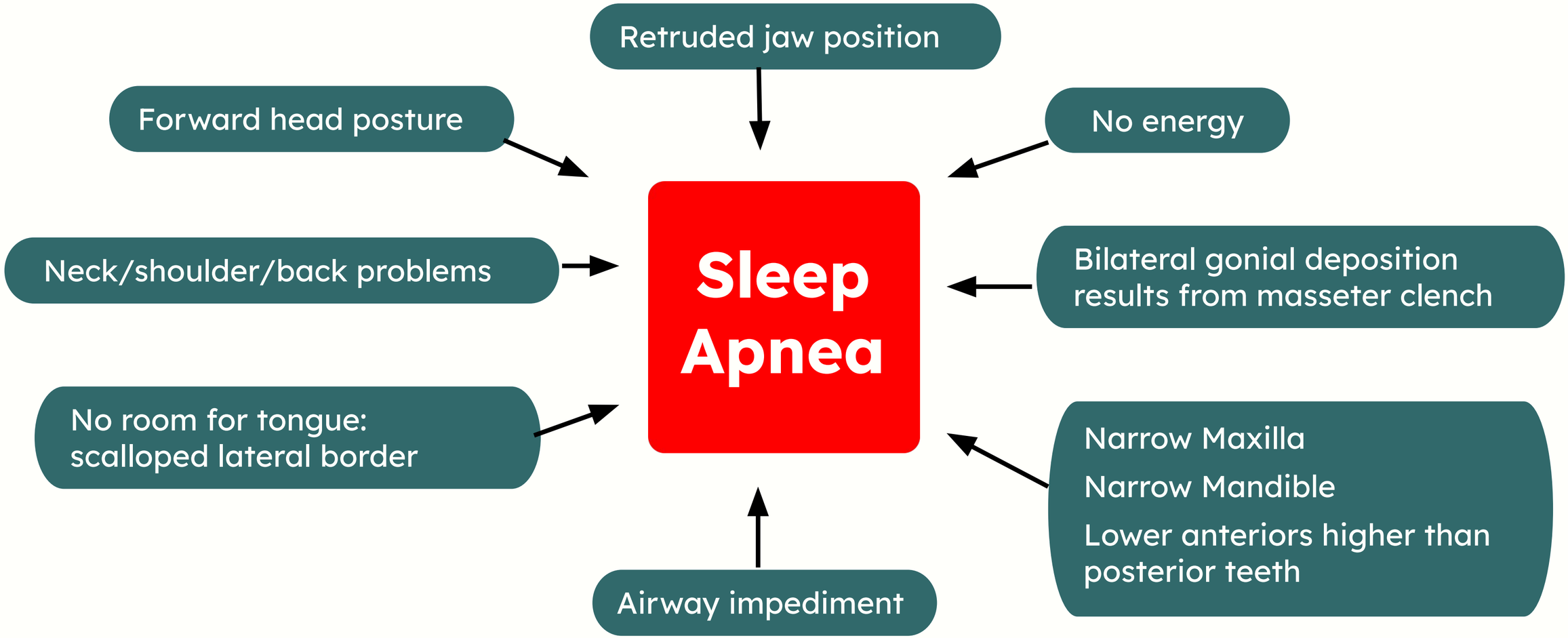


Limited mouth opening

Reflux

Chronic fatigue

TMJ Disease and Sleep Apnea:



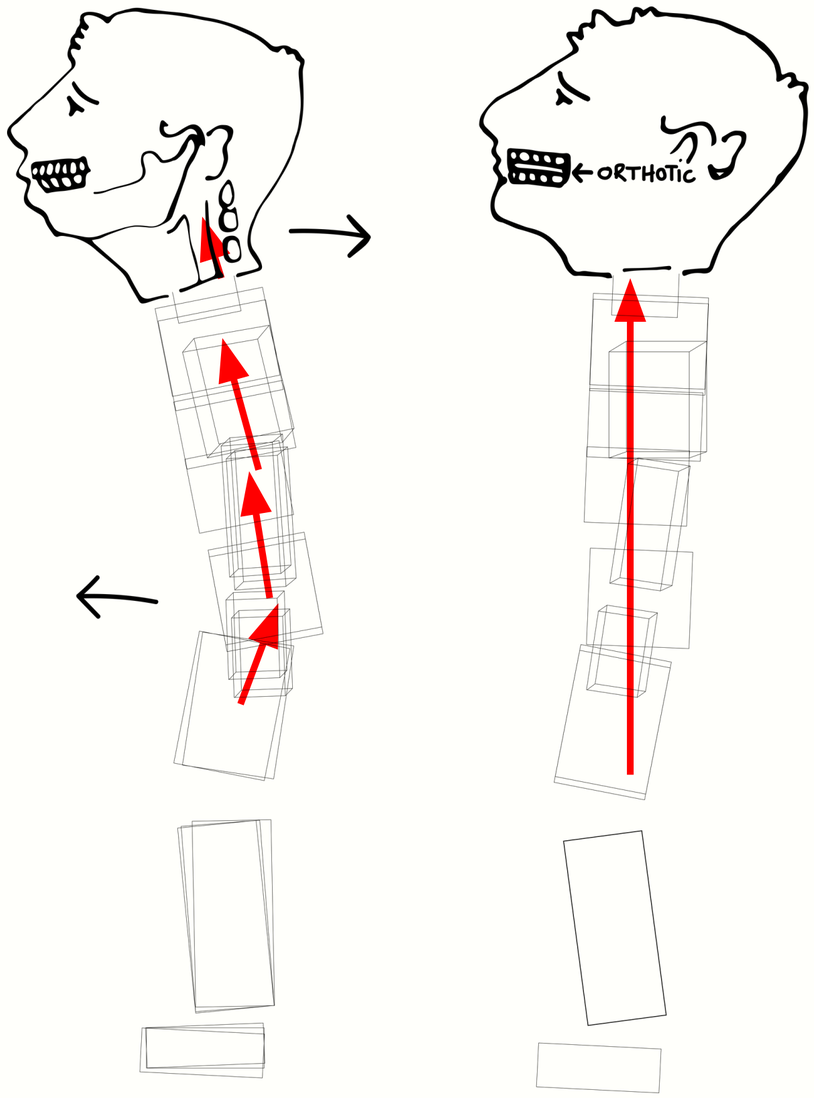
TMJ Disease and Sleep Apnea:

Documented

- Mandible trapped posteriorly by dentition
- Soft tissue trapped and shortened
- Forward head – ALL TMJ/SLEEP APNEA have scalenes on fire
- ALL dysfunction repetitive actions lead to:
  - Painful muscles
  - Forward head
  - Postural collapse
  - Insufficient diaphragmatic action

Did You Know?

Lollipop Neck



Most physicians do not address the most significant influencer on posture

despite considerable evidence that posture affects physiology and function.

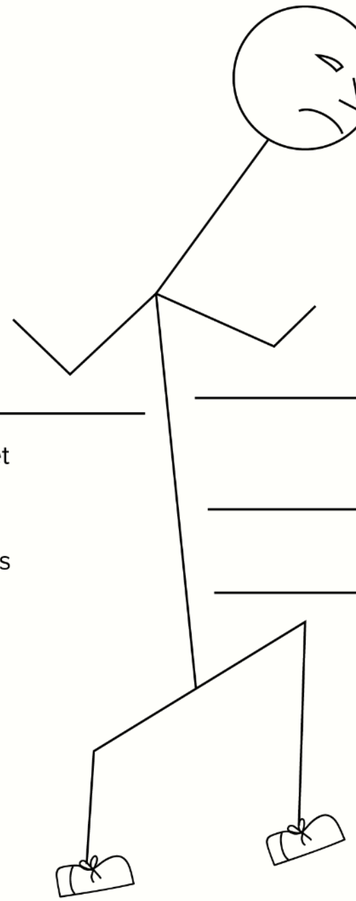
"Spinal pain, headache, mood, blood pressure, pulse, and lung capacity are among the functions most easily influenced by posture. The corollary of these observations is that many symptoms, including pain, may be moderated or eliminated by posture."

- Postural and Respiratory Modulation of Autonomic Function, Pain & Health

"People with uncorrected FHP can suffer chronic or unpleasant conditions such as pinched nerves and blood vessels, like thoracic outlet syndrome fibromyalgia, chronic strains, and early degeneration, and arthritis."

- Orthopedic Physical Therapy

FHP, Sleep Apnea, & Posture Concerns



Forward head posture

Creation of Thoracic outlet 1st rib/clavicle compress brachial plexus subclavian artery

Upper chest breating scalenes/ 1st rib affected adversely

Reflux potential

No diaphramatic breathing

Not using:

- Transverse abdominis
- Inferior obliques
- Pelvic floor

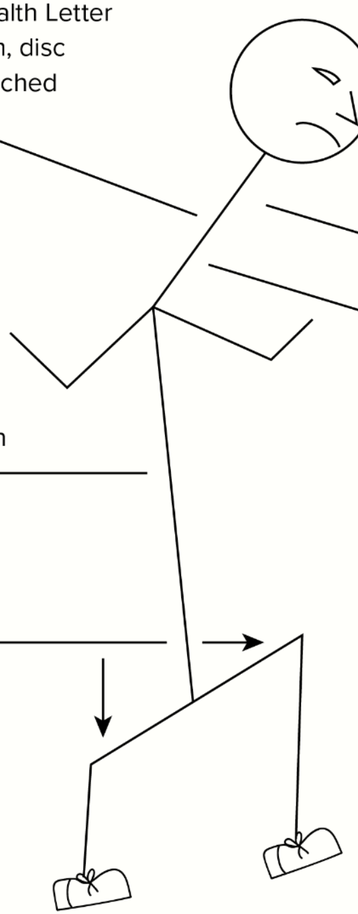
To stimulate

a) Intestines

b) Create lower back curve as head is over spine

March 2000 Mayo Clinic Health Letter

"FHP Also leads to myospasm, disc herniations, arthritis, and pinched nerves. Digenerative neck goes hand in hand with balance problems especially in the elderly."



"The body follows the head"

"Therefore the entire body is best aligned by first restoring proper functional alignment to the head."

Enlon - The aiway is the keystone of the face

Hyoid bone only bone not connected to another bone...suspended in throat in 20 muscles.

Disc compression/herniation
Spinal stenosis

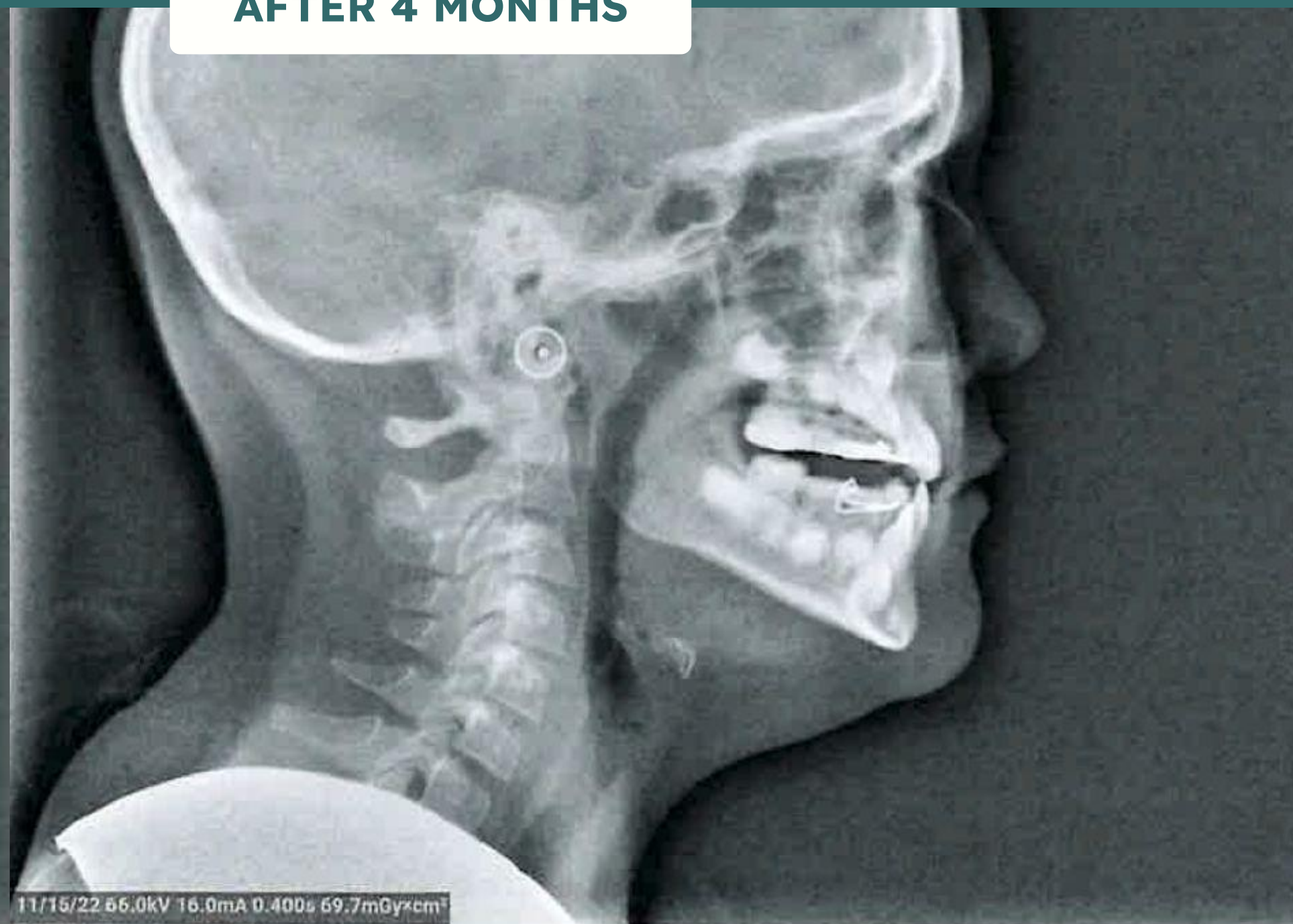
Uneven hips short leg
arthritis in hips, knees

Potential Class III TMJ Sleep Apnea Patient

Age 9, Postural Sleep Concerns, Resolved of Symptomology

BEFORE

AFTER 4 MONTHS

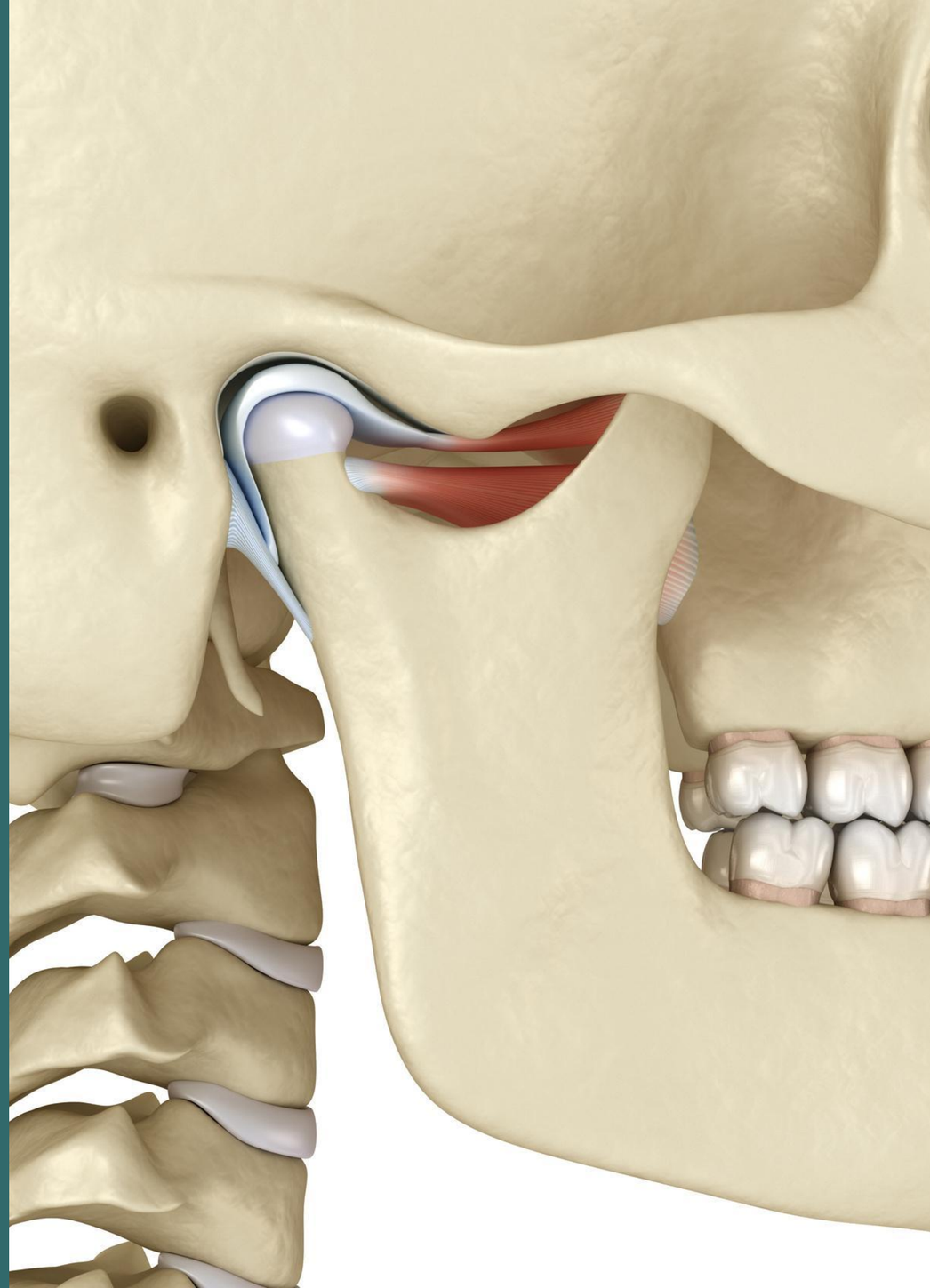


Treatment Methods

How do we successfully treat and cure TMJ disease?

If it is not measured, it is opinion.

If it is measured, it is FACT.

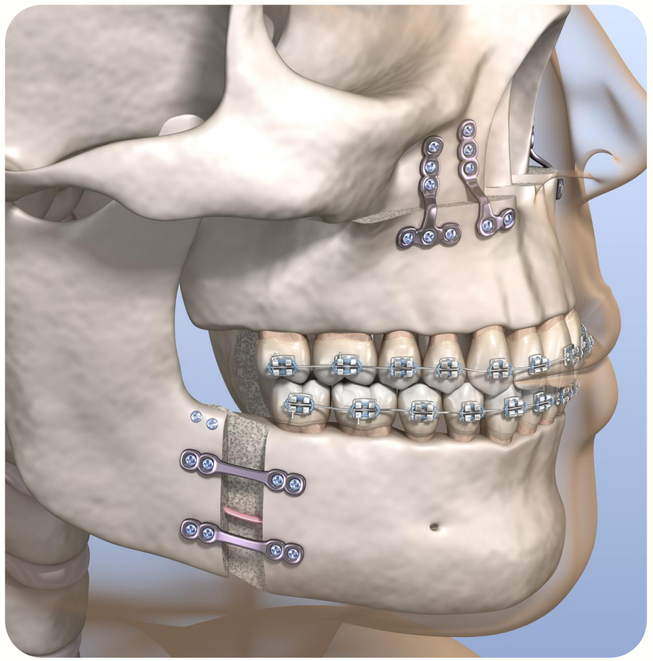


TMJ Disease Cannot be Cured by

SPLINTS

BRACES

SURGERY



TMJ Treatments

TMJ Exam: tomographic images

Trigger point: muscles check posture, bite

K7 myotronics

Jaw/head: ROM - TMJ locks up cervicals

Soft splints

Neuromuscular Orthotic vs. Splint

Neuromuscular Orthotic

- Not Generic
- Places condyles in optimum intracapsular and extra capsular position
- Worn 24/7 for function
- Neuromuscular Orthotic is Dynamic

Splints

- Generic
- Separates upper from lower jaw with arbitrary height
- Worn when sleeping only - Static, not functional
- Does not address intra & extra capsular problems

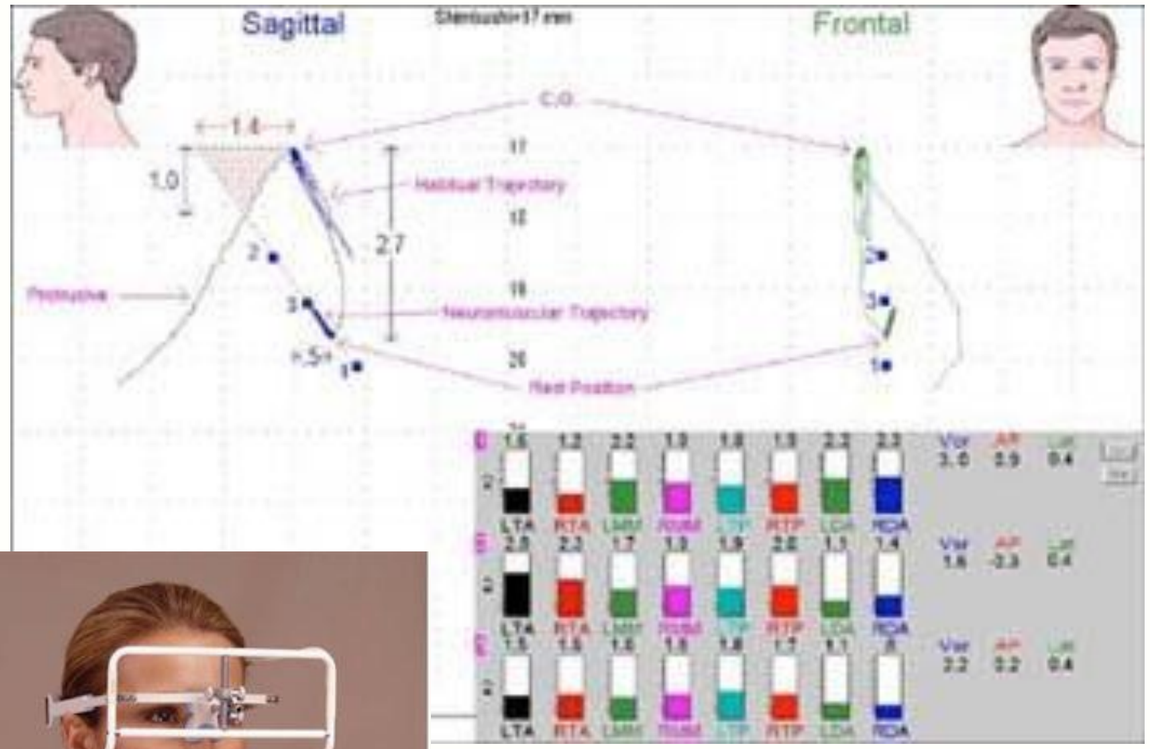
Neuromuscular Measuring

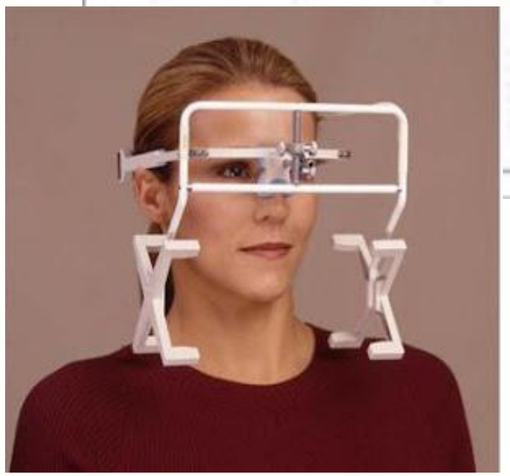
Instantaneously EMGs with simultaneous jaw tracking creates 3D intra-oral bite position. Muscle recruitment and power will be satisfied at the moment in that position.*

K-7 COMPUTER

PLANMECA X-RAY

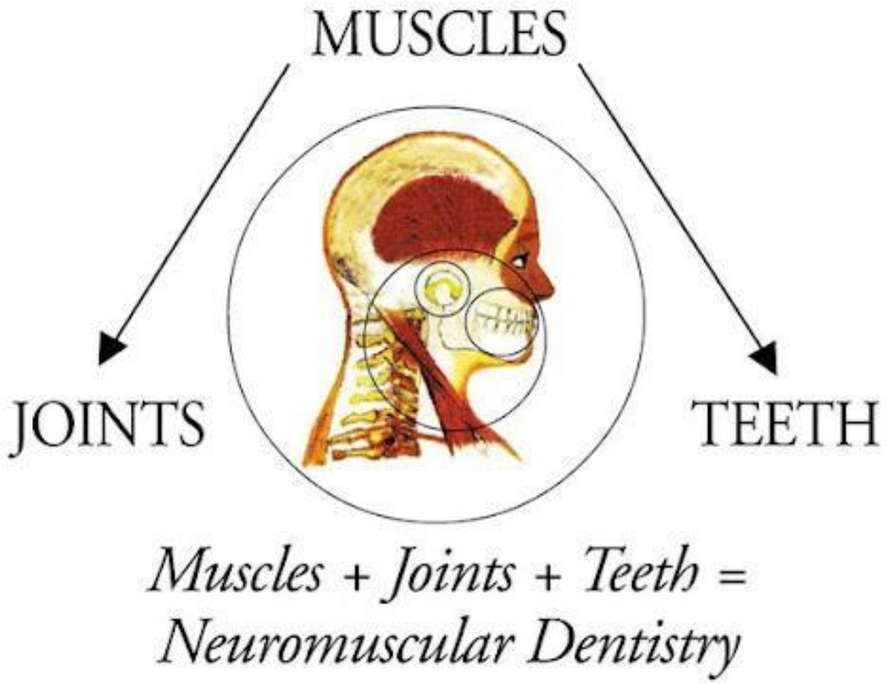
K7 Myotronics





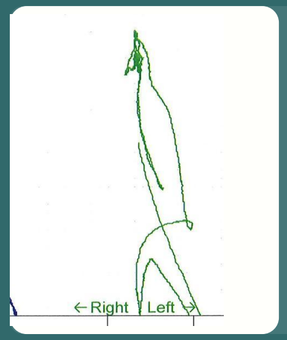
- Simultaneous EMG readings with jaw tracking
- Demonstrates
  - Swallow dysfunction
  - Muscle dysfunction
  - Intra-capsular disorders
  - Lack of muscle recruitment

How Neuromuscular Therapy Works



Neuromuscular Therapy is based on establishing a balance between the muscles of the head and neck, the temporomandibular joints, and the teeth.

Creating Proper Muscle Function



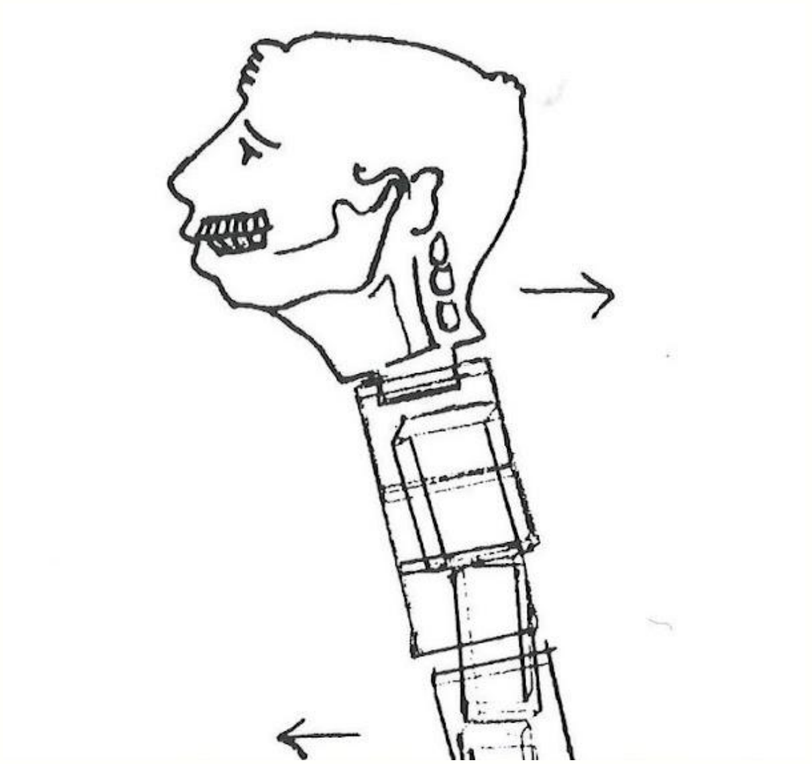
Neuromusclar Measurement

Ultra-Low Dose Radiology

Neuromuscular Orthotic (NMO)

Treatment is Able To Provide

A neuromuscular bite position with EMG measure to make
an intra-oral neuromuscular orthotic for optimum 3-dimensional muscle recruitment.



INTEGRATE POSTURE WITH BITE

SLEEP APNEA FINDINGS WITH TMJ

Bite change can be seen on orthotic as
posture/bite change occur through function.

"Mom, my throat is open, I can breathe."

This quote is from a 9 year old girl who had problems with swallowing, breathing and operations for fluid in her ears. Close inspection revealed a deep bite or over closure. This deep bite brings the lower jaw backwards toward the ear and brings the tongue and neck muscles backwards toward the throat impeding airway.

Through neuromuscular computer and tomography x-ray, a proper bite was established that eliminated the deep bite and brought the jaw forward; thus relieving the TM Joints, bringing the tongue and muscles attached to the jaw forward. This will create an open airway day and night.

Phase I of TMJ Treatment

Bite change can be seen on orthotic, as bite changes occur through function and time.

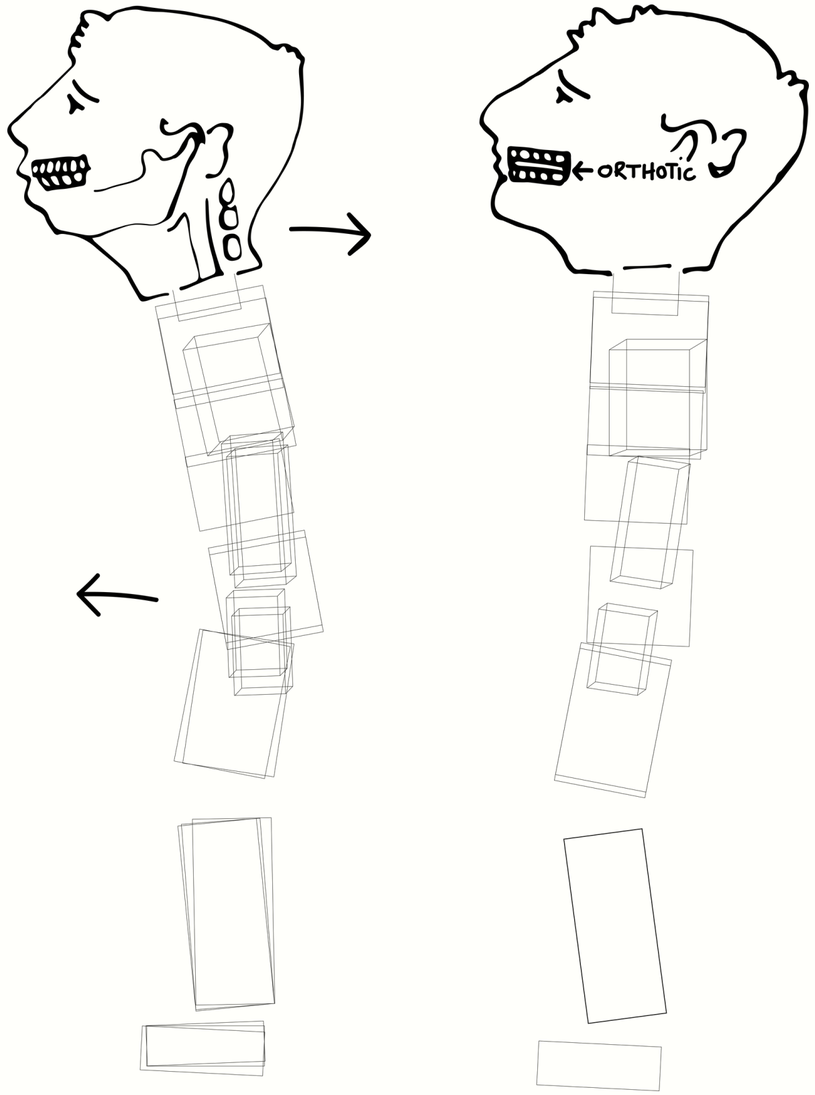
Elimination of symptoms in 4-6 months

Stabilization of bite/muscles/ posture in 6-10 months

Did You Know?

All cured patients of TMJ disease have a posterior open bite after Phase I.

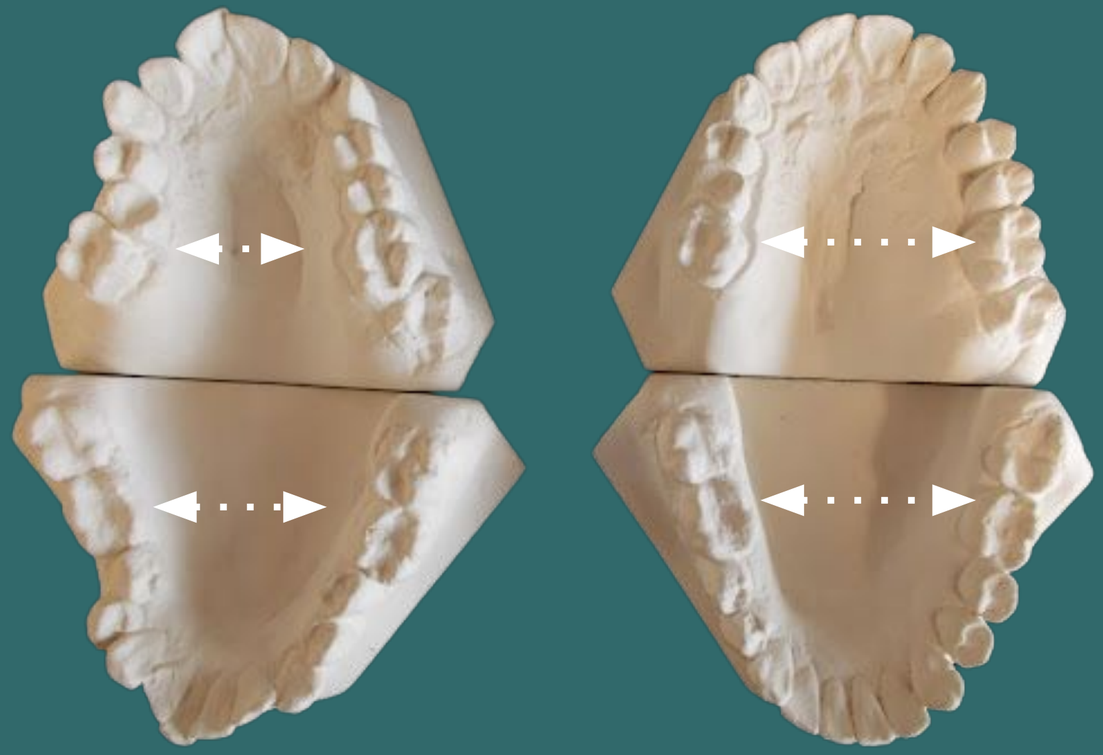
Phase II of TMJ Treatment

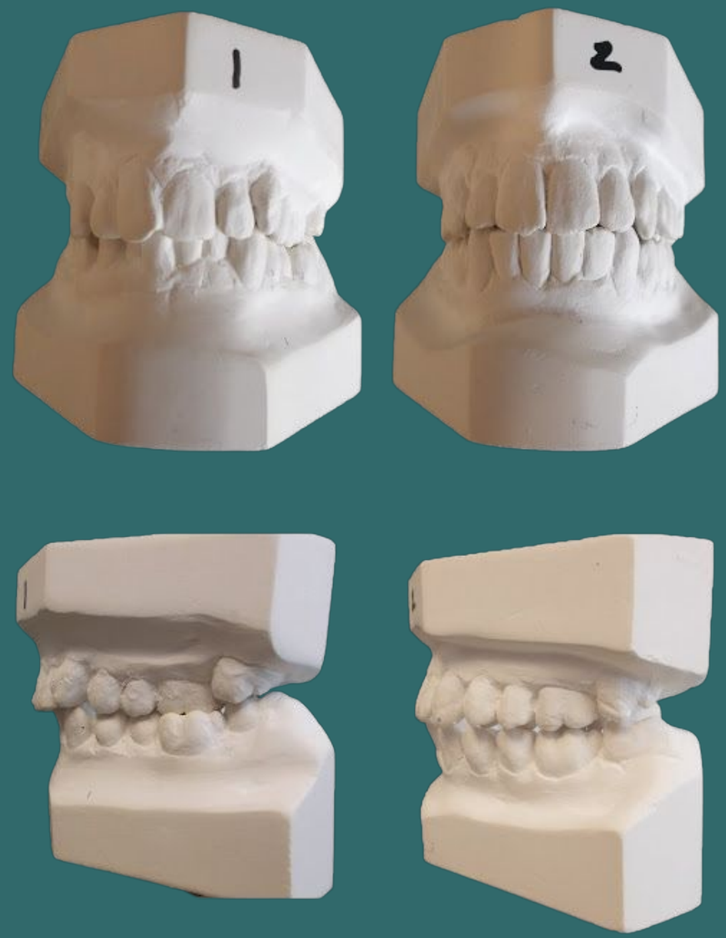


Create permanent functional jaw position

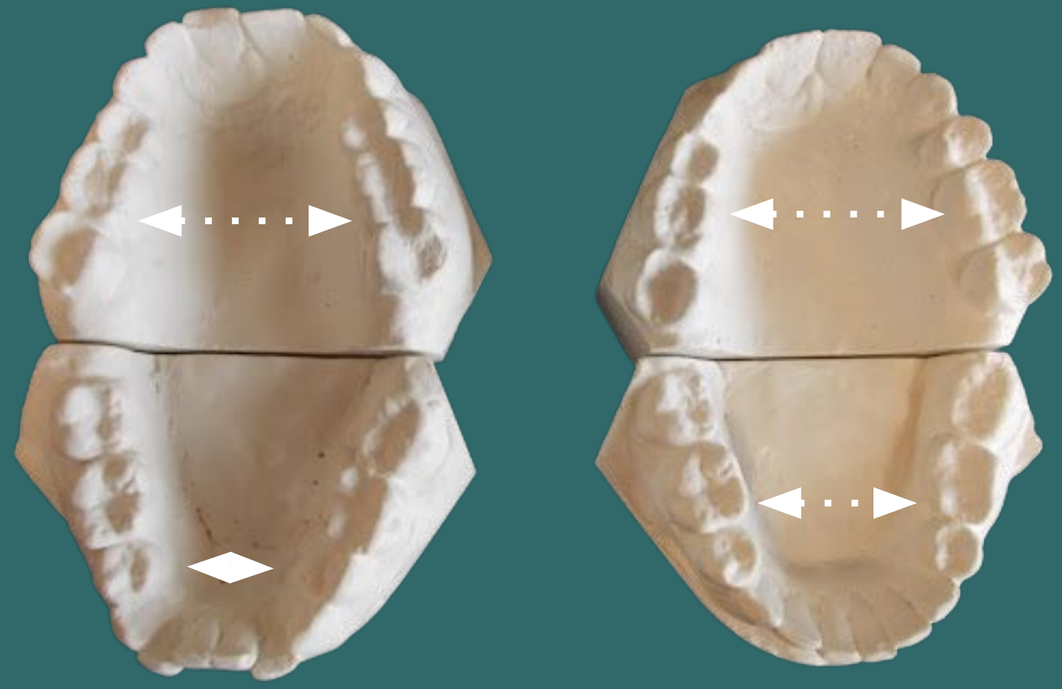
- Permanent NMO appliance
- Special orthodontic therapy
  - Never long teeth
  - Create tooth eruption by building bone (osteoblasts)
  - Maintain proper intra/extra capsular position

Before & After TMJ Disease Treatment

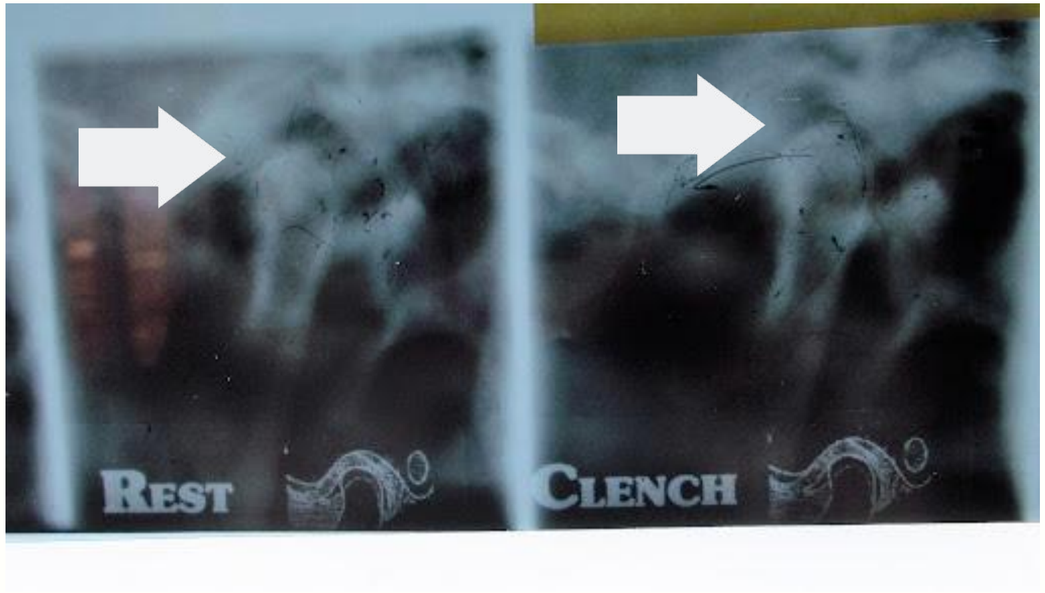


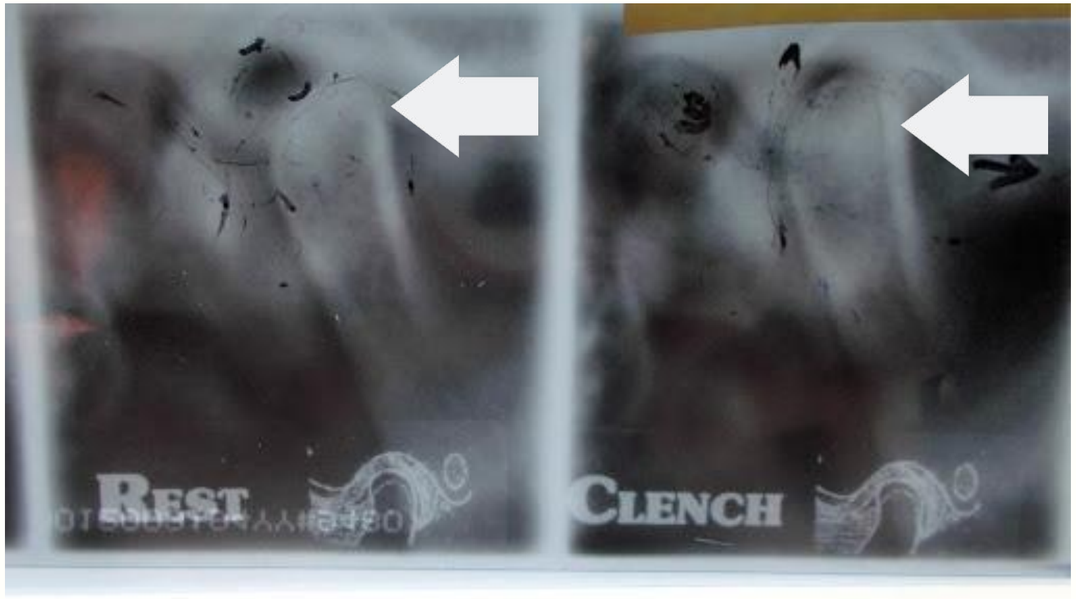


Before & After TMJ Disease Treatment

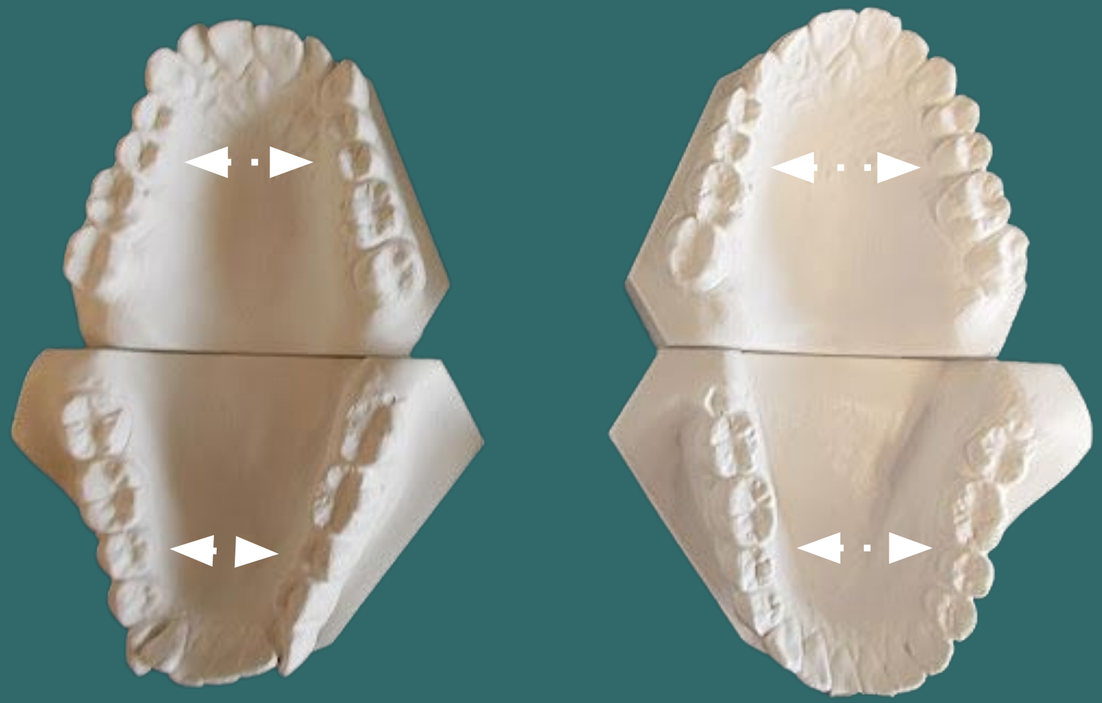


Tomos Revel Condylar Position on Clench with 4 Bicuspid Extraction

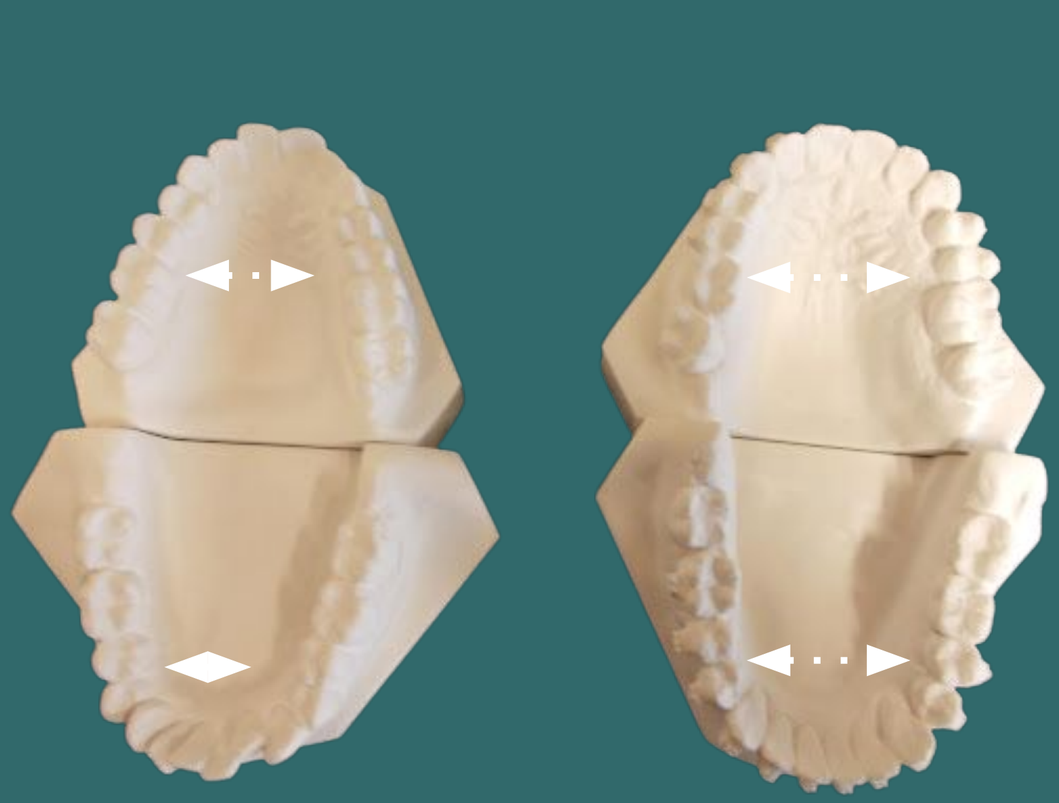


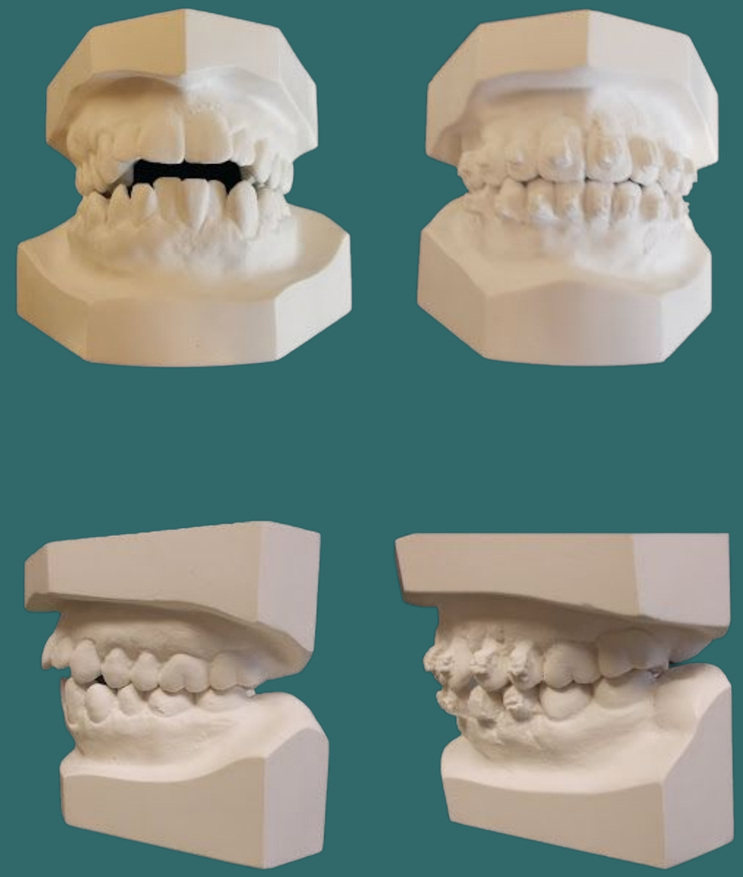


Before & After TMJ Disease Treatment

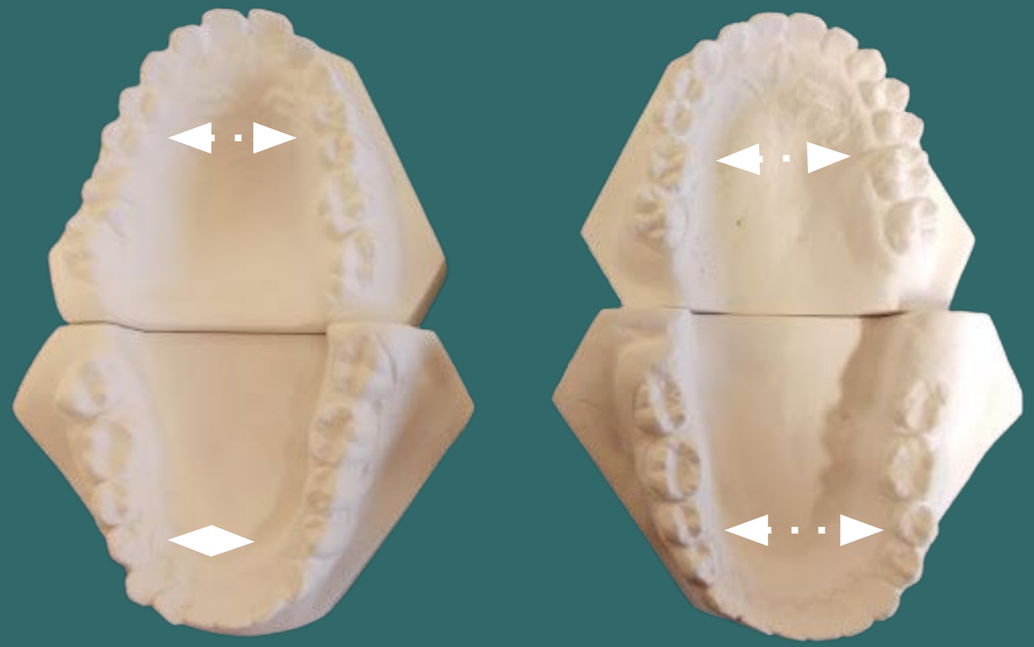


Before & After TMJ Disease Treatment

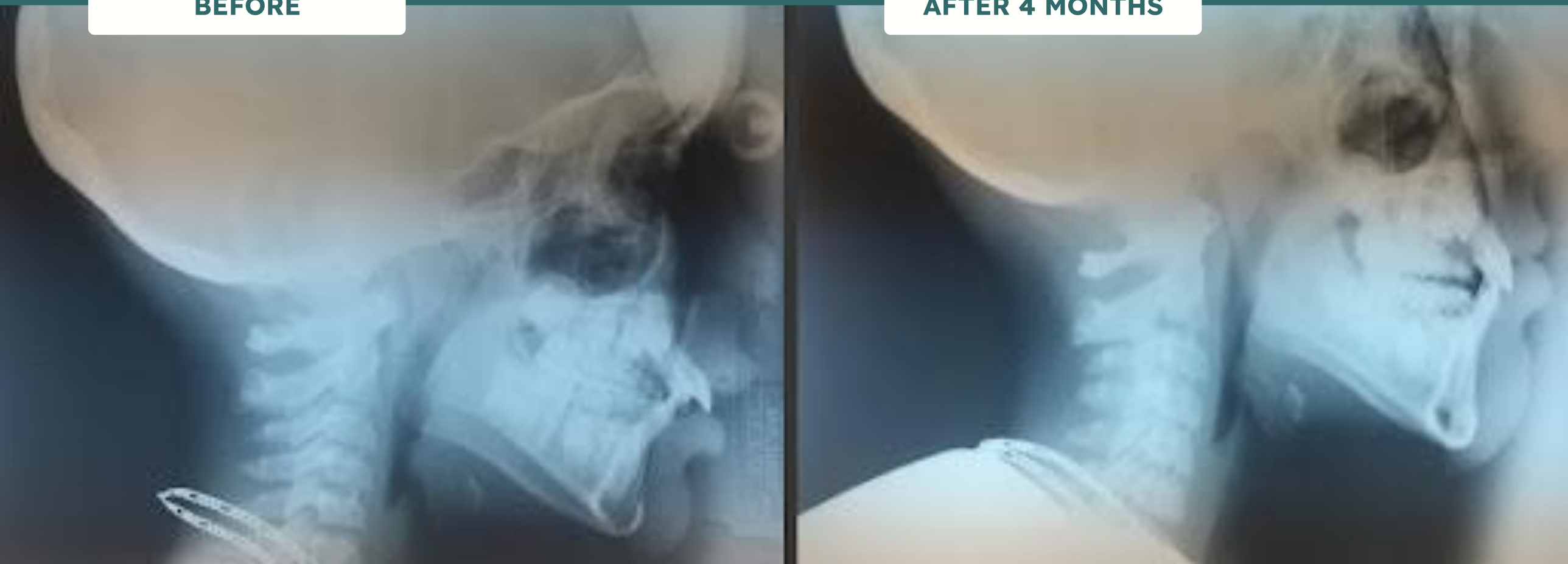




Before & After TMJ Disease Treatment



Before & After TMJ Disease Treatment



Before & After TMJ Disease

Treatment in Children with
Neuromuscular Twinblock Therapy

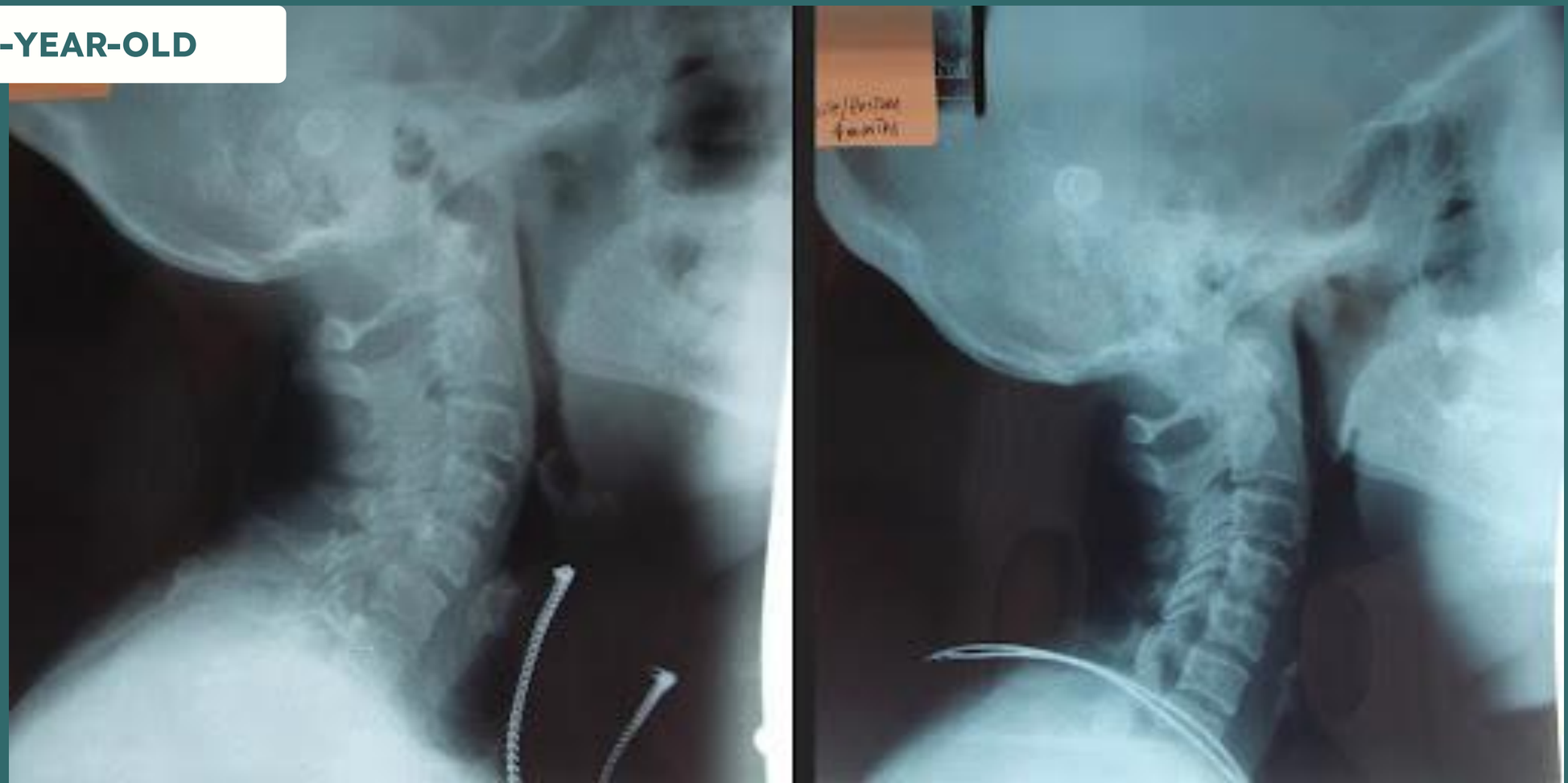
Before & After TMJ Disease Treatment

CLASS III

Before & After TMJ Disease Treatment

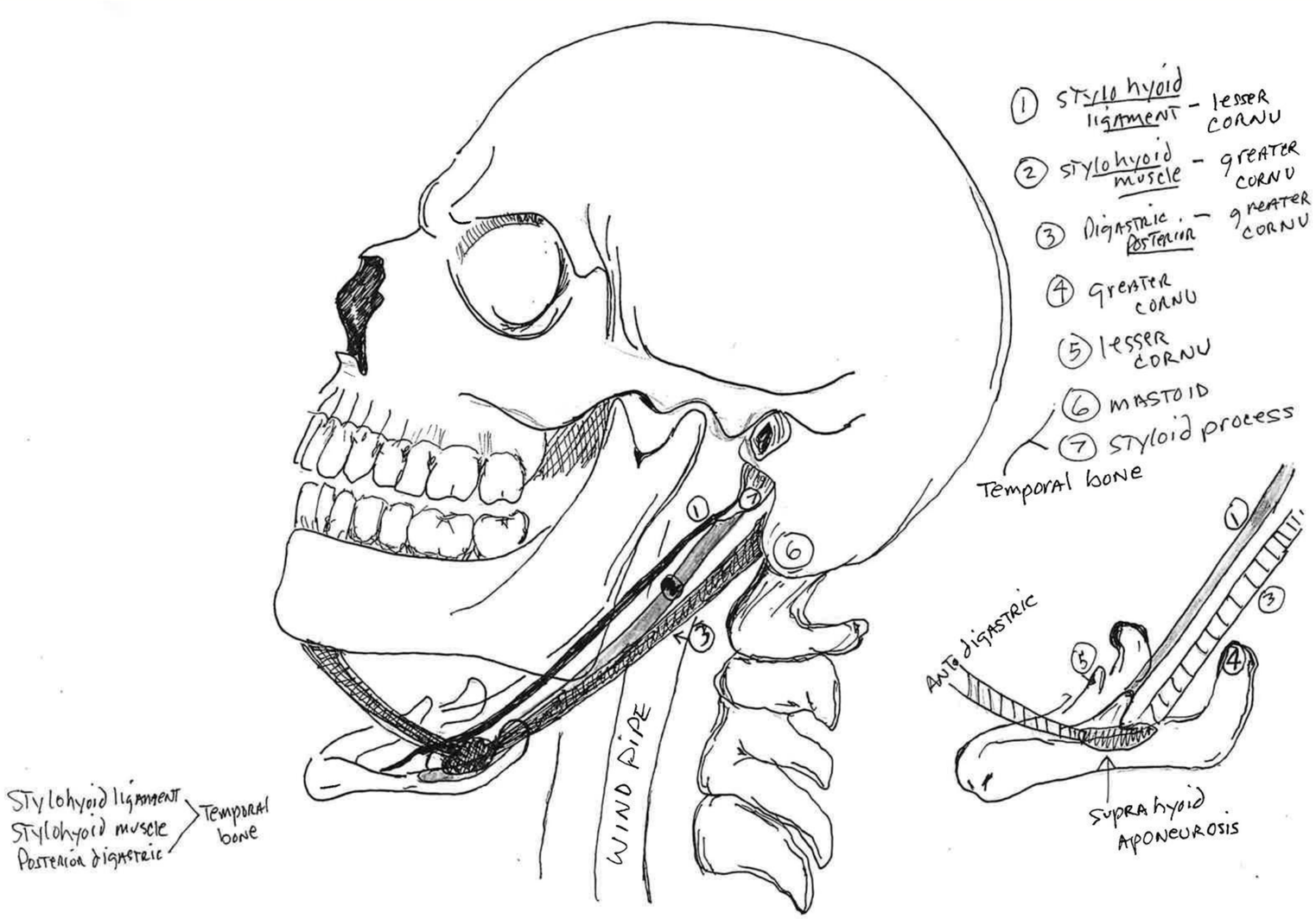
Before & After TMJ Disease Treatment

40-YEAR-OLD



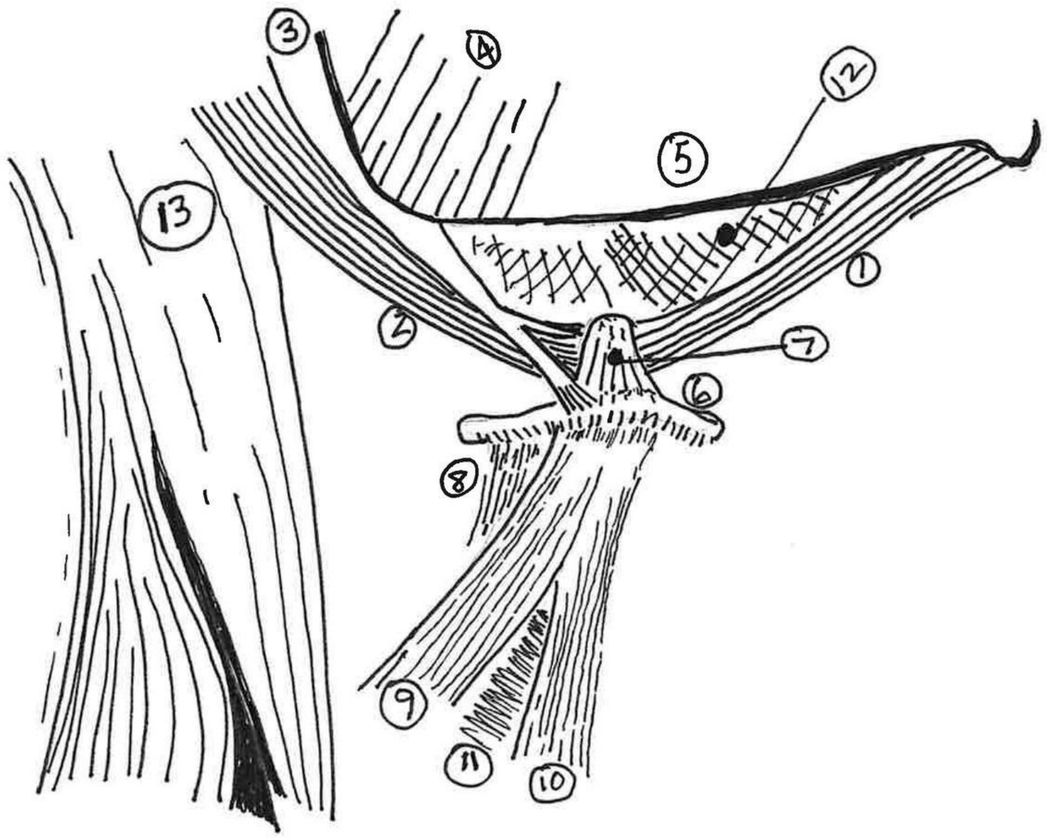
Before & After TMJ Disease Treatment

The Hyoid Bone



- 20 muscles insert into the hyoid bone.
- The hyoid bone is responsible for airway and posture due to the outer flanges and central positioning of the bone in the throat.

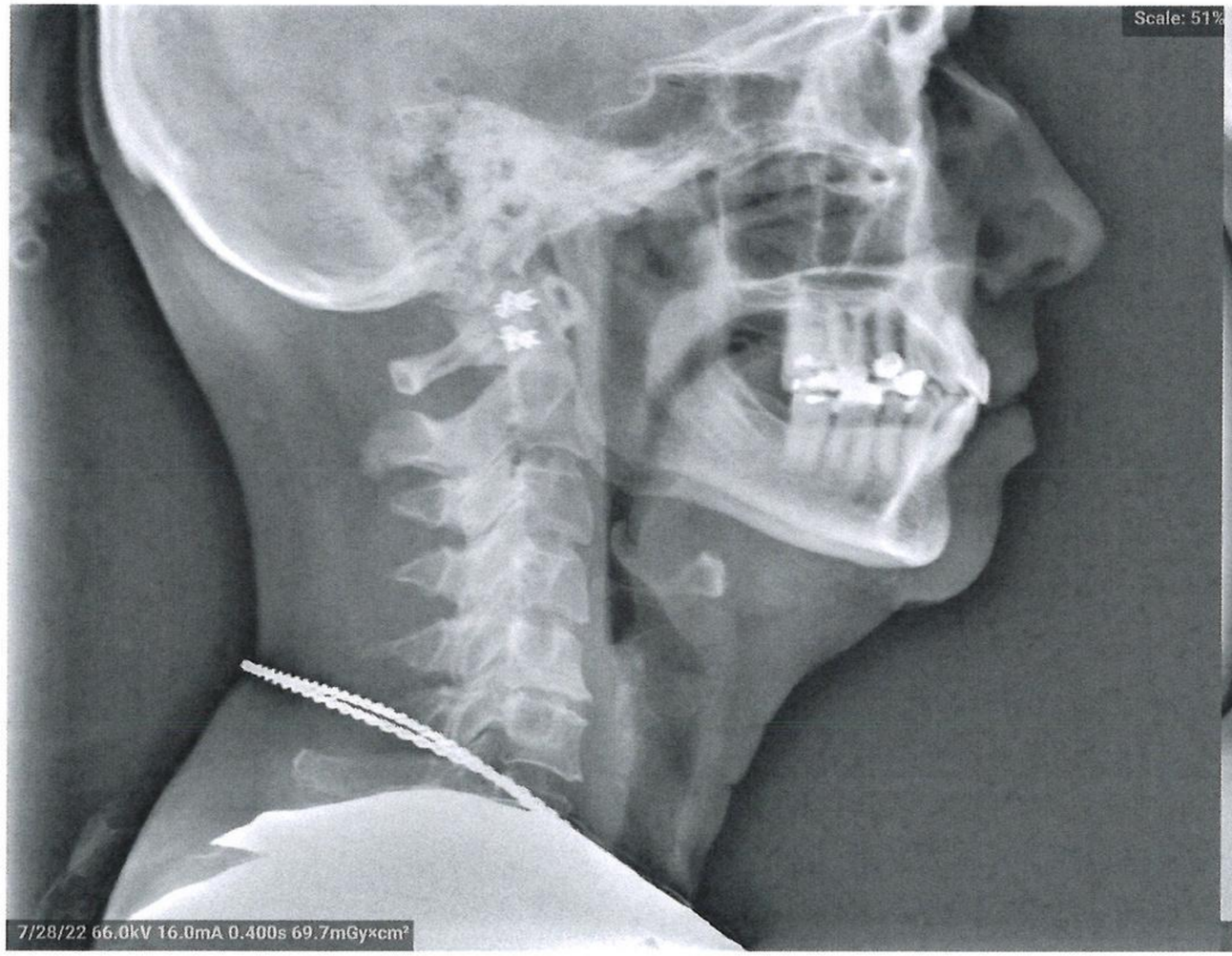
The Hyoid Bone

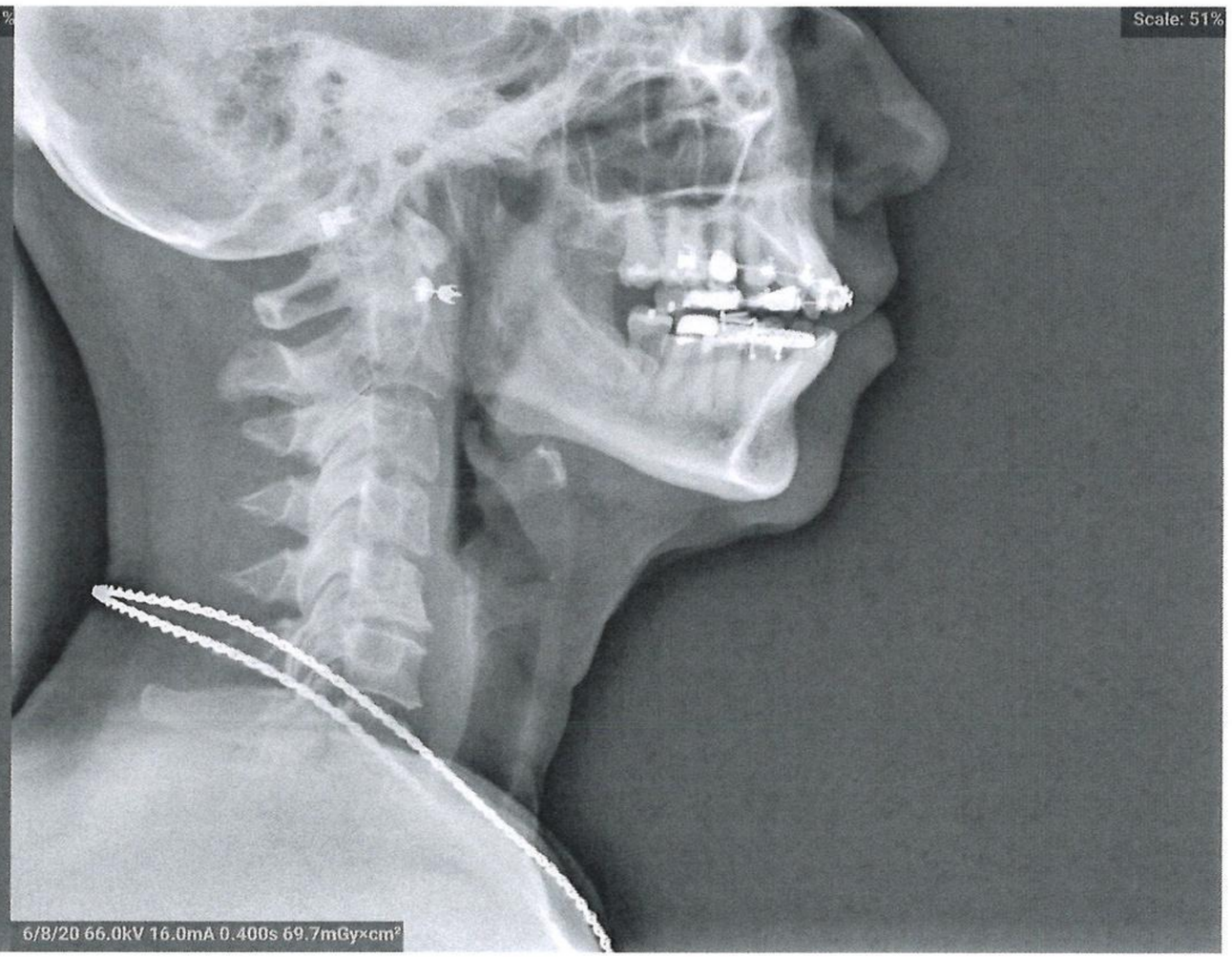


1. Anterior belly digastric
2. posterior belly digastric
3. Stylohyoid muscle
4. masseter
5. mandible
6. hyoid bone
7. supra hyoid. aponeurosis
8. Thyrohoid
9. omohyoid superior belly
10. sternohyoid
11. sternoThyroid
12. mylohyoid
13. sternocleidomastoid

- There are only 2 muscles from the skull that insert into the hyoid bone.
  - Posterior digastric
  - Stylohyoid muscle
- They form an aponeurosis on the greater cornu of the hyoid (spot weld).
- The head become a lever associated with bad or good posture and (dys)functional bite.

The Hyoid - Liz



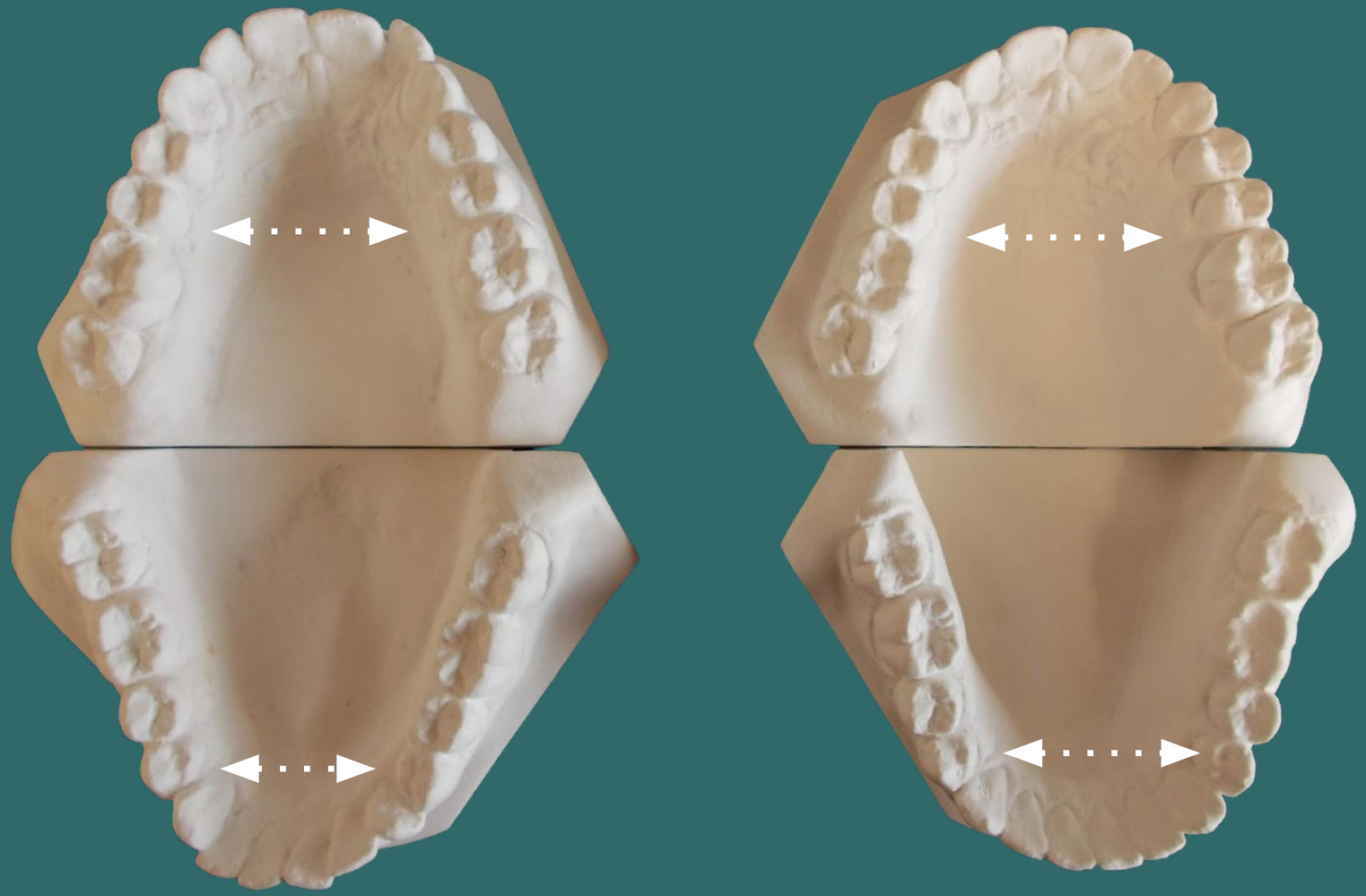


Curve of Spee

Case Study

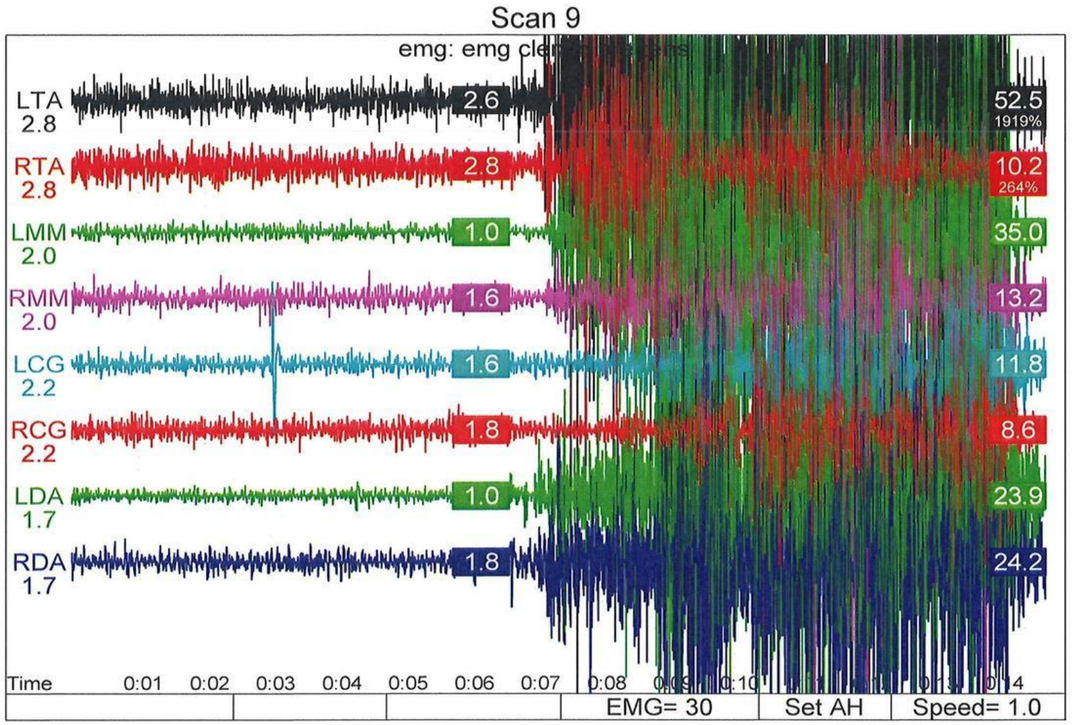
Case Study

Case Study



Case Study Arnie Scans

K7 MYOTRONICS

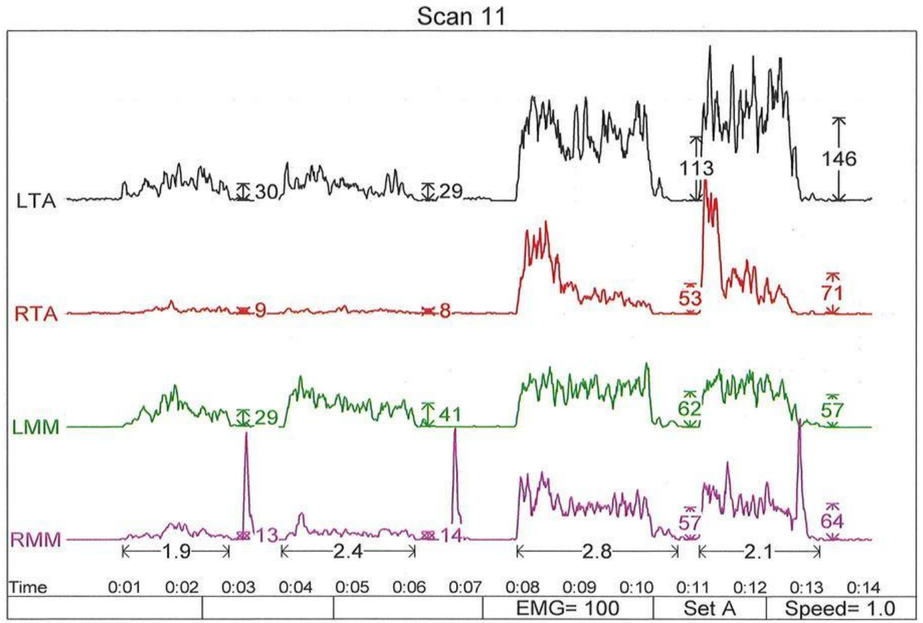


SAMPLE - 14.71 seconds

LTA (Left Temporalis Anterior)	Avg= 2.6 uV	CO Avg= 52.5 uV
RTA (Right Temporalis Anterior)	Avg= 2.8 uV	CO Avg= 10.2 uV
LMM (Left Masseter)	Avg= 1.0 uV	CO Avg= 35.0 uV
RMM (Right Masseter)	Avg= 1.6 uV	CO Avg= 13.2 uV
LCG (Left Cervical Group)	Avg= 1.6 uV	CO Avg= 11.8 uV
RCG (Right Cervical Group)	Avg= 1.8 uV	CO Avg= 8.6 uV
LDA (Left Digastric)	Avg= 1.0 uV	CO Avg= 23.9 uV
RDA (Right Digastric)	Avg= 1.8 uV	CO Avg= 24.2 uV

Comment:
emg: emg clench pre tens

Bite Recruitment EMG



Clench 1 over 1.9 Seconds

LTA	(Left Temporalis Anterior)	Peak= 66 uV,	Average= 30.1 uV
RTA	(Right Temporalis Anterior)	Peak= 24 uV,	Average= 9.4 uV
LMM	(Left Masseter)	Peak= 73 uV,	Average= 29.5 uV
RMM	(Right Masseter)	Peak= 30 uV,	Average= 13.0 uV

Firing Order - LTA LMM RMM RTA

Clench 2 over 2.4 Seconds

LTA	(Left Temporalis Anterior)	Peak= 67 uV,	Average= 29.4 uV
RTA	(Right Temporalis Anterior)	Peak= 15 uV,	Average= 7.7 uV
LMM	(Left Masseter)	Peak= 91 uV,	Average= 41.2 uV
RMM	(Right Masseter)	Peak= 50 uV,	Average= 14.2 uV

Firing Order - LTA LMM RMM RTA

Clench 3 over 2.8 Seconds

LTA	(Left Temporalis Anterior)	Peak= 189 uV,	Average= 112.6 uV
RTA	(Right Temporalis Anterior)	Peak= 164 uV,	Average= 53.3 uV
LMM	(Left Masseter)	Peak= 109 uV,	Average= 62.4 uV
RMM	(Right Masseter)	Peak= 122 uV,	Average= 57.1 uV

Firing Order - LTA LMM RMM RTA

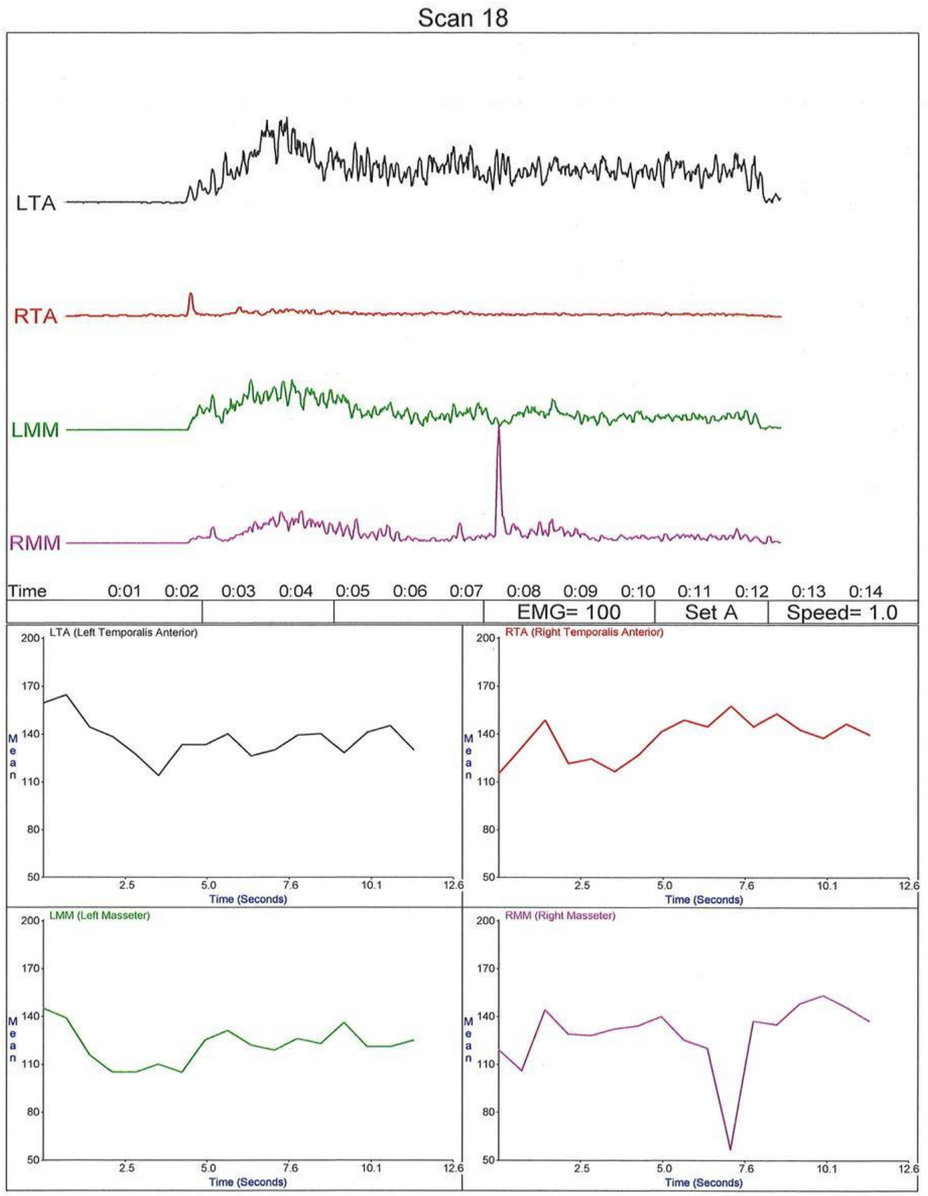
Clench 4 over 2.1 Seconds

LTA	(Left Temporalis Anterior)	Peak= 272 uV,	Average= 146.3 uV
RTA	(Right Temporalis Anterior)	Peak= 251 uV,	Average= 71.5 uV
LMM	(Left Masseter)	Peak= 105 uV,	Average= 57.3 uV
RMM	(Right Masseter)	Peak= 212 uV,	Average= 64.4 uV

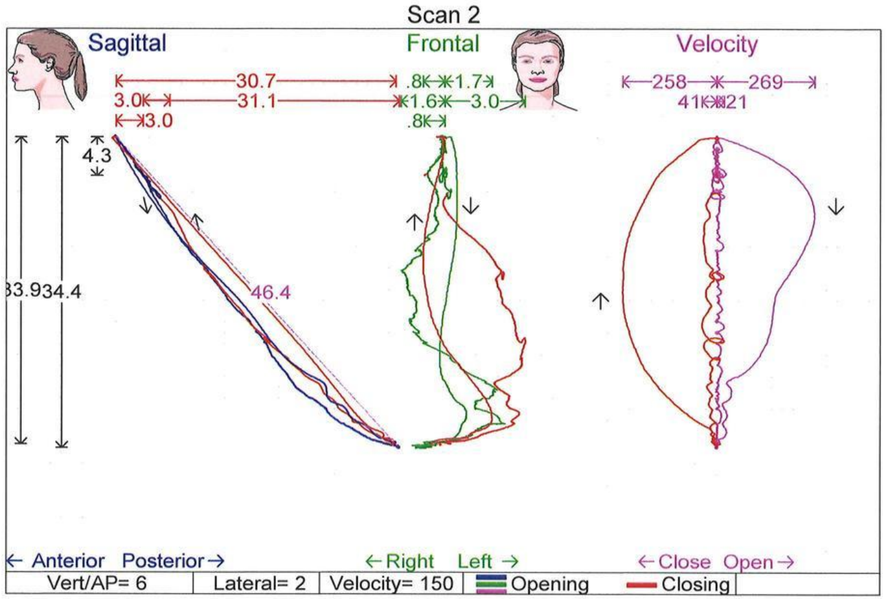
Firing Order - RMM LTA LMM RTA

Bite Recruitment EMG

10 SECOND INTERVAL



Jaw Tracking

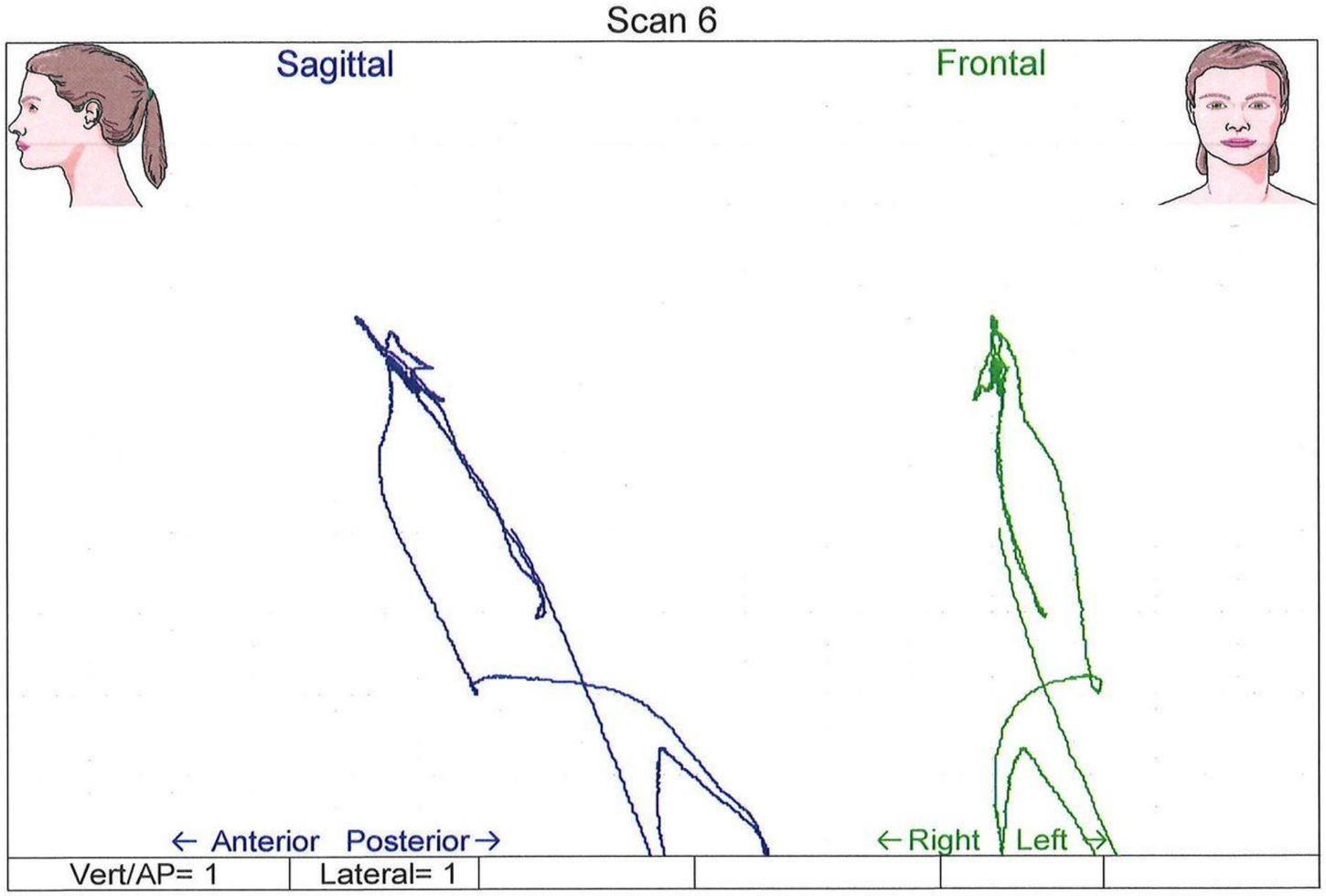


********** Opening 1 **********
Opening
Maximum Velocity = 15.0 mm/sec
Average Velocity = 2.5 mm/sec
Closing
Maximum Velocity = 3.8 mm/sec
Average Velocity = 0.0 mm/sec
Maximum Velocity of Terminal Tooth Contact= 0 mm/sec

********** Opening 2 **********
Opening
Maximum Velocity = 21.3 mm/sec
Average Velocity = 5.3 mm/sec
Closing
Maximum Velocity = 41.3 mm/sec
Average Velocity = 20.3 mm/sec
Maximum Velocity of Terminal Tooth Contact= 0 mm/sec

********** Opening 3 **********
Opening
Maximum Velocity = 268.8 mm/sec
Average Velocity = 91.5 mm/sec
Closing
Maximum Velocity = 257.5 mm/sec
Average Velocity = 180.2 mm/sec
Maximum Velocity of Terminal Tooth Contact= 199 mm/sec

Swallow Pattern

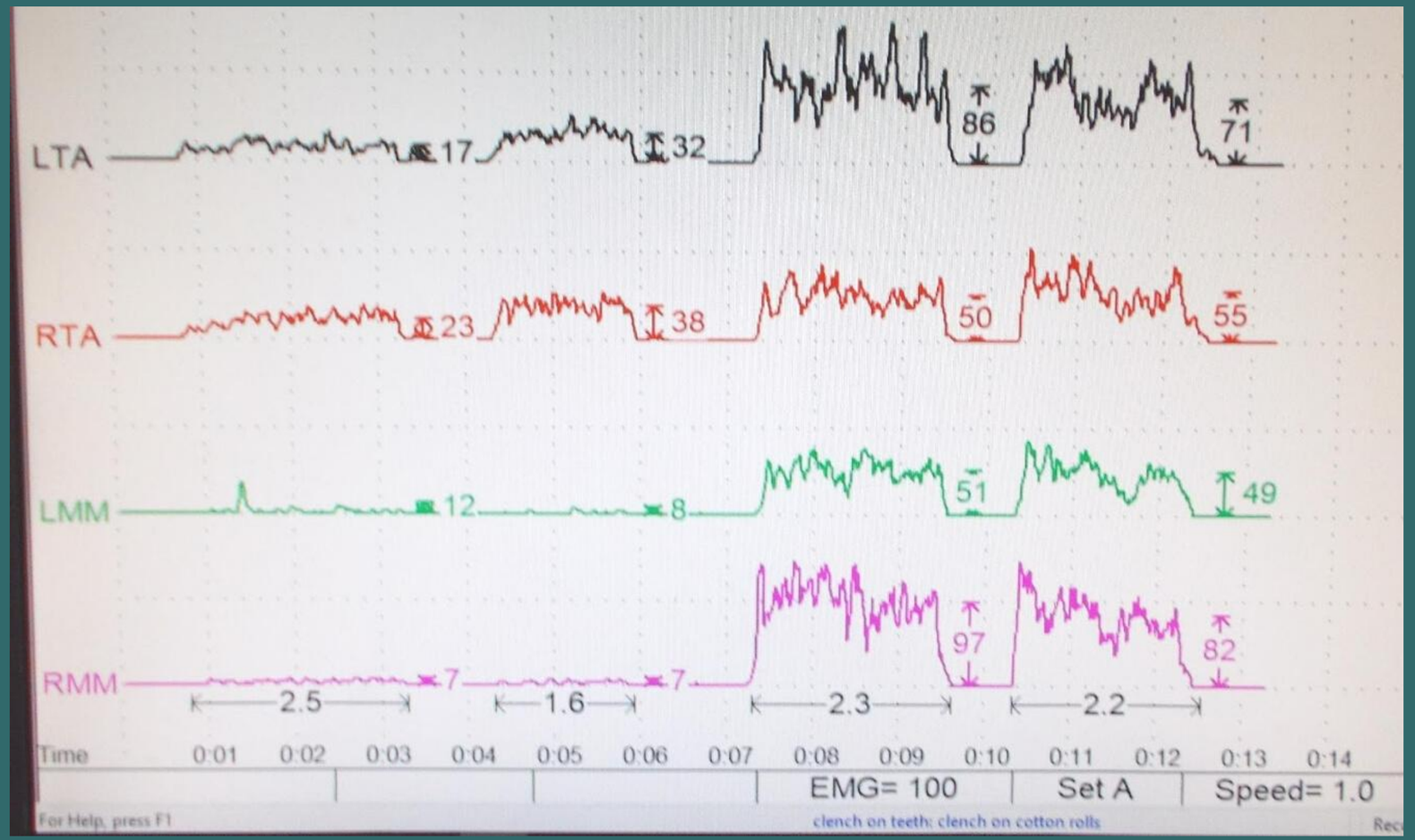


Patient Swallowed with Teeth Together

K7 Myotronic Scans

CLENCH ON TEETH

CLENCH ON COTTON ROLLS



K7 Myotronic Scans

3D BITE SCAN WITH INSTANTANEOUS EMG READINGS

Before and After Vertical Eruption

POSTERIOR TOOTH ERUPTION

Case Study - Karen

Before

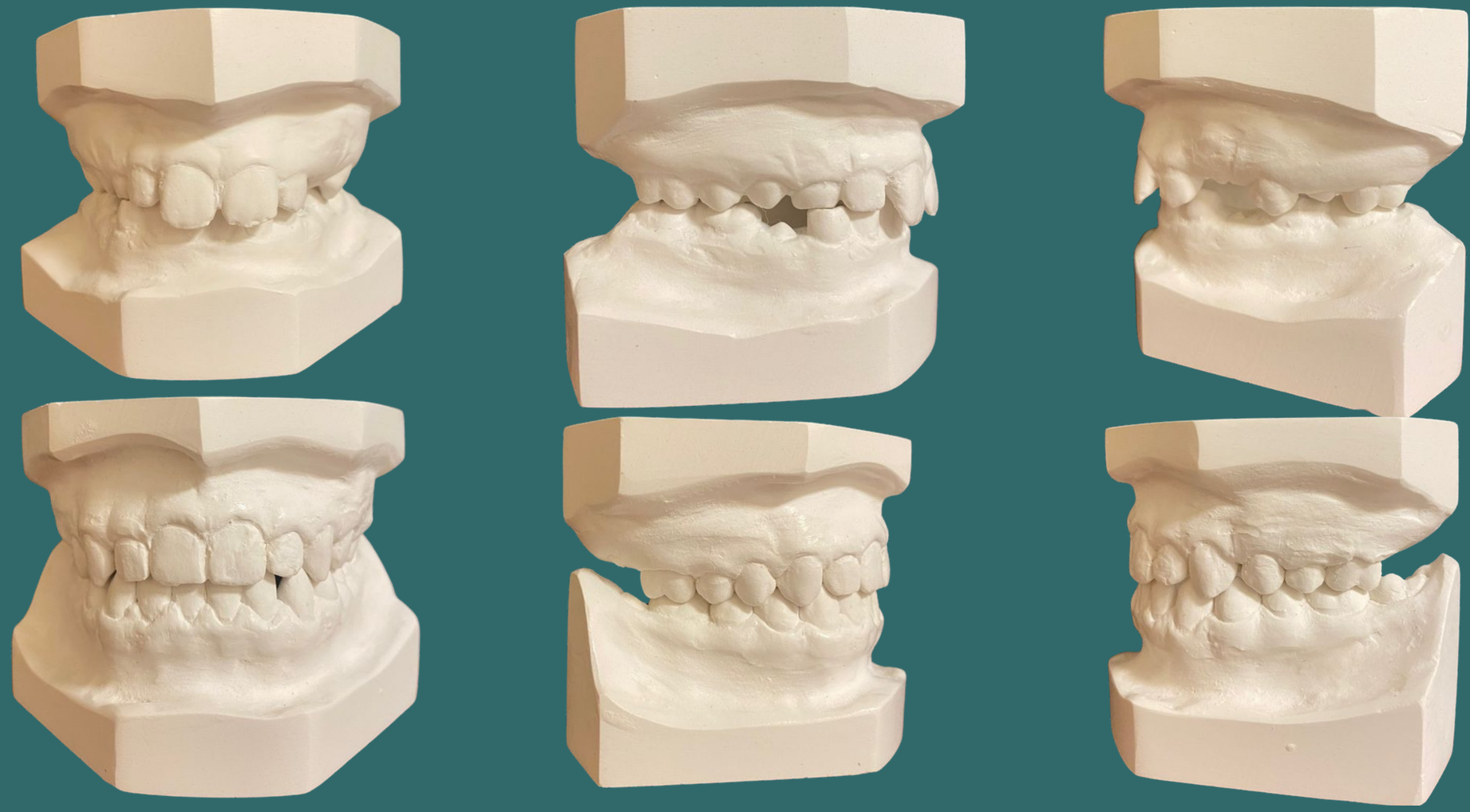
After

Case Study - Karen

Case Study - Stephen

Before

After



Case Study - Stephen

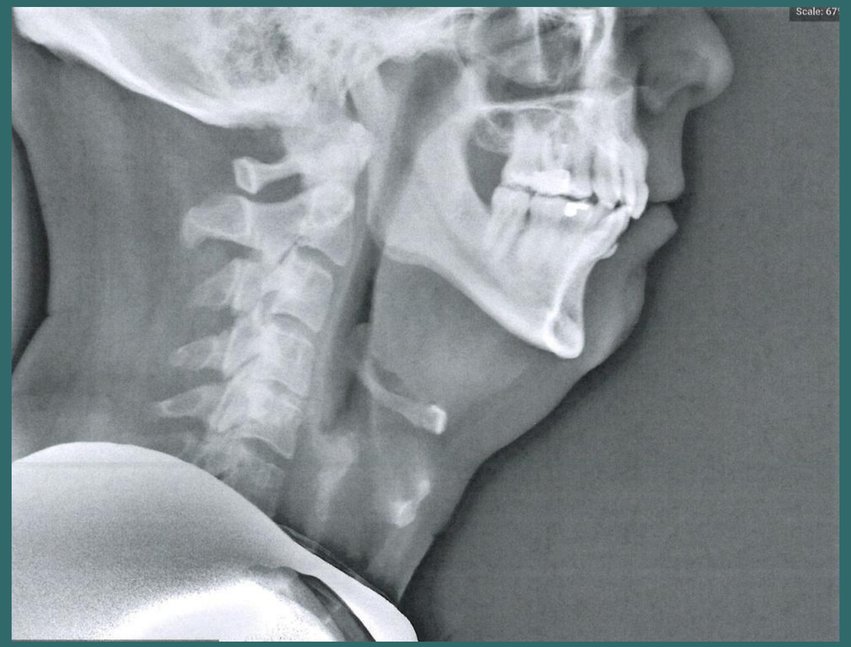
Case Study - Steve

Before

After

Case Study - Steve

Case Study - Steve



Snap-on Case

Natural Teeth

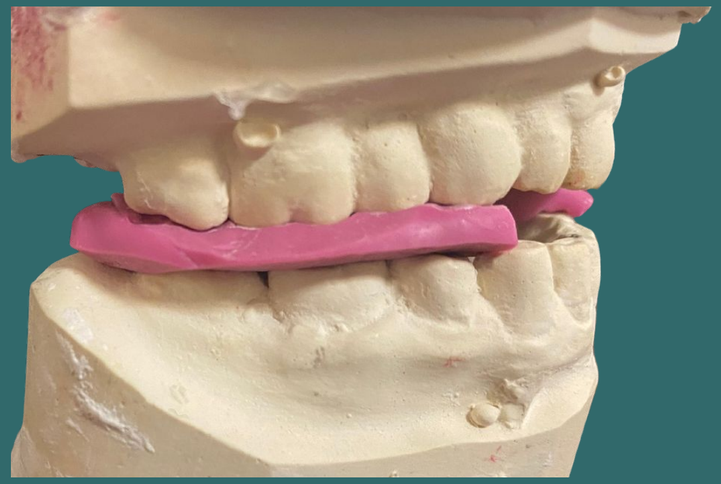
Snap-on Case

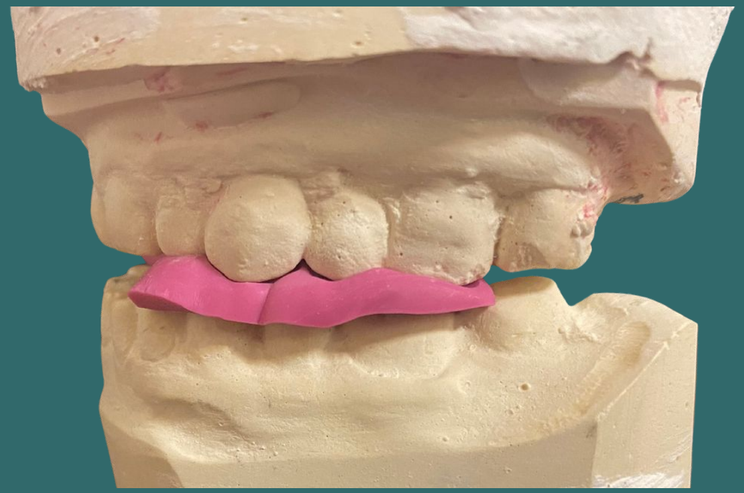
Before

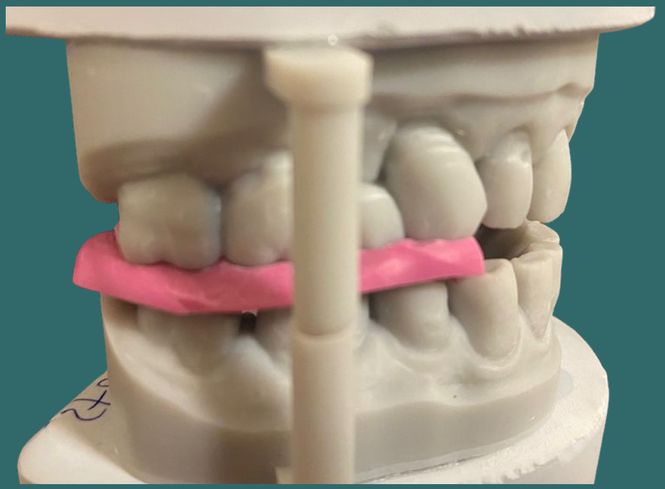
After

Snap-on Case

Natural Teeth with Neuromuscular Bite







Snap-on Case

in Neuromuscular Bite Position

Articulated Lower & Upper Case

Upper

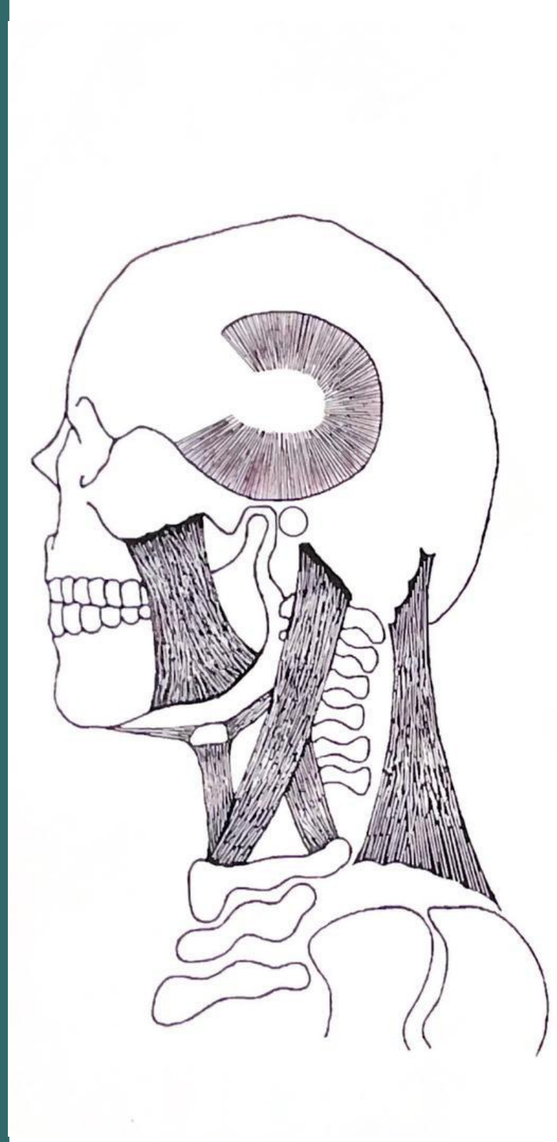
Lower

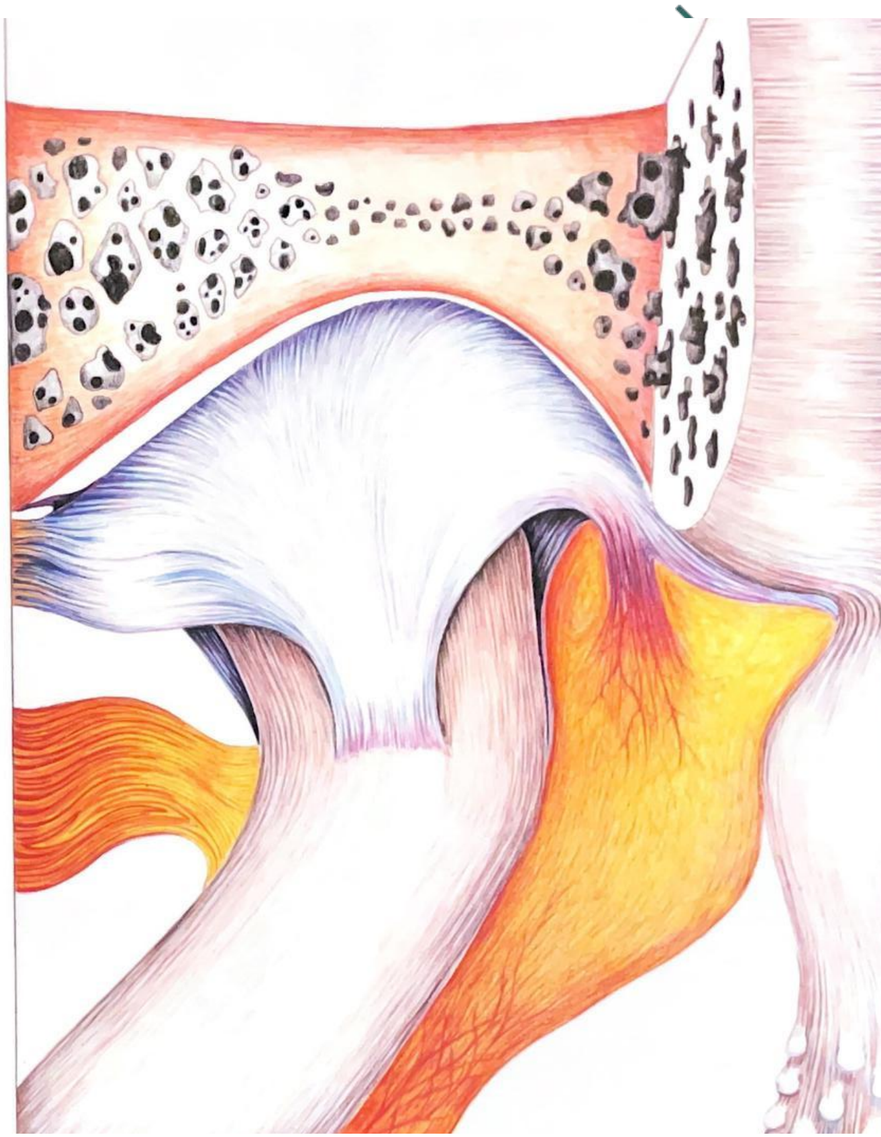
Snap-on acts as a neuromuscular orthotic plus aethetics

Snap-on Case

The Biophysio-Mechanics Straight Rear-End Collision

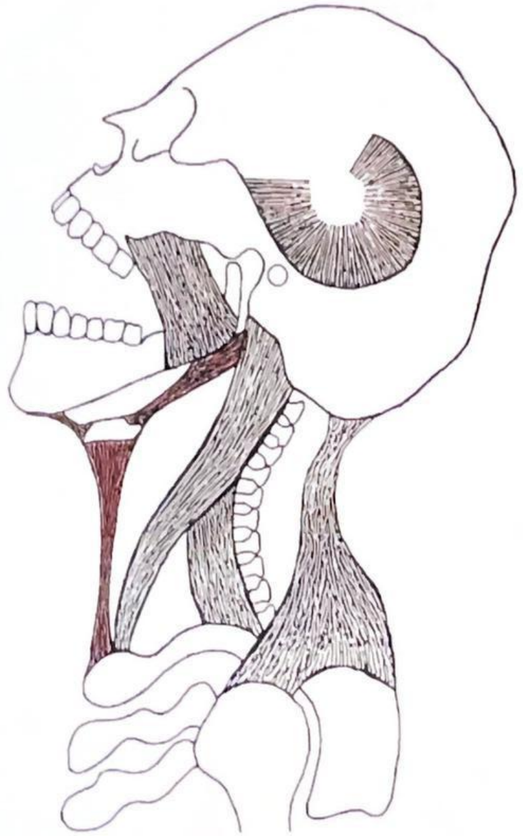
Proper Position

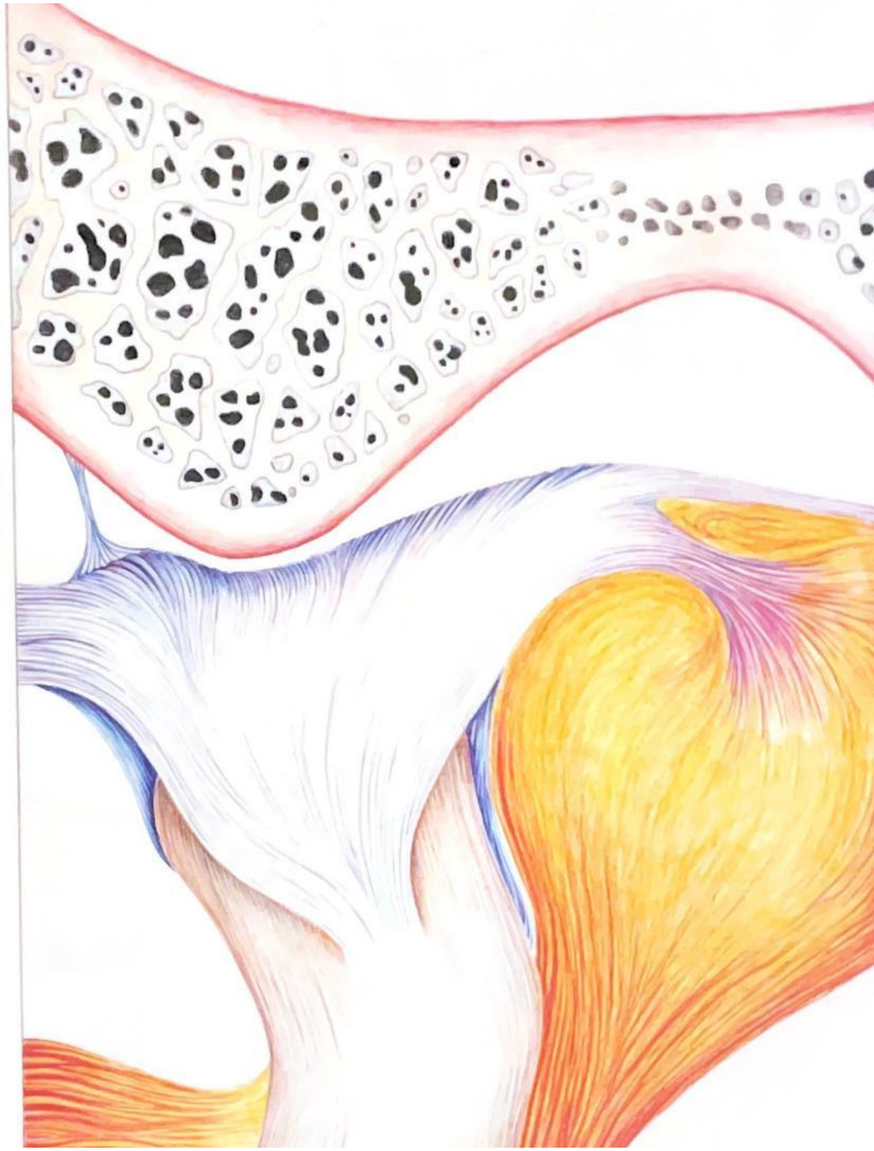




The Biophysio-Mechanics Straight Rear-End Collision

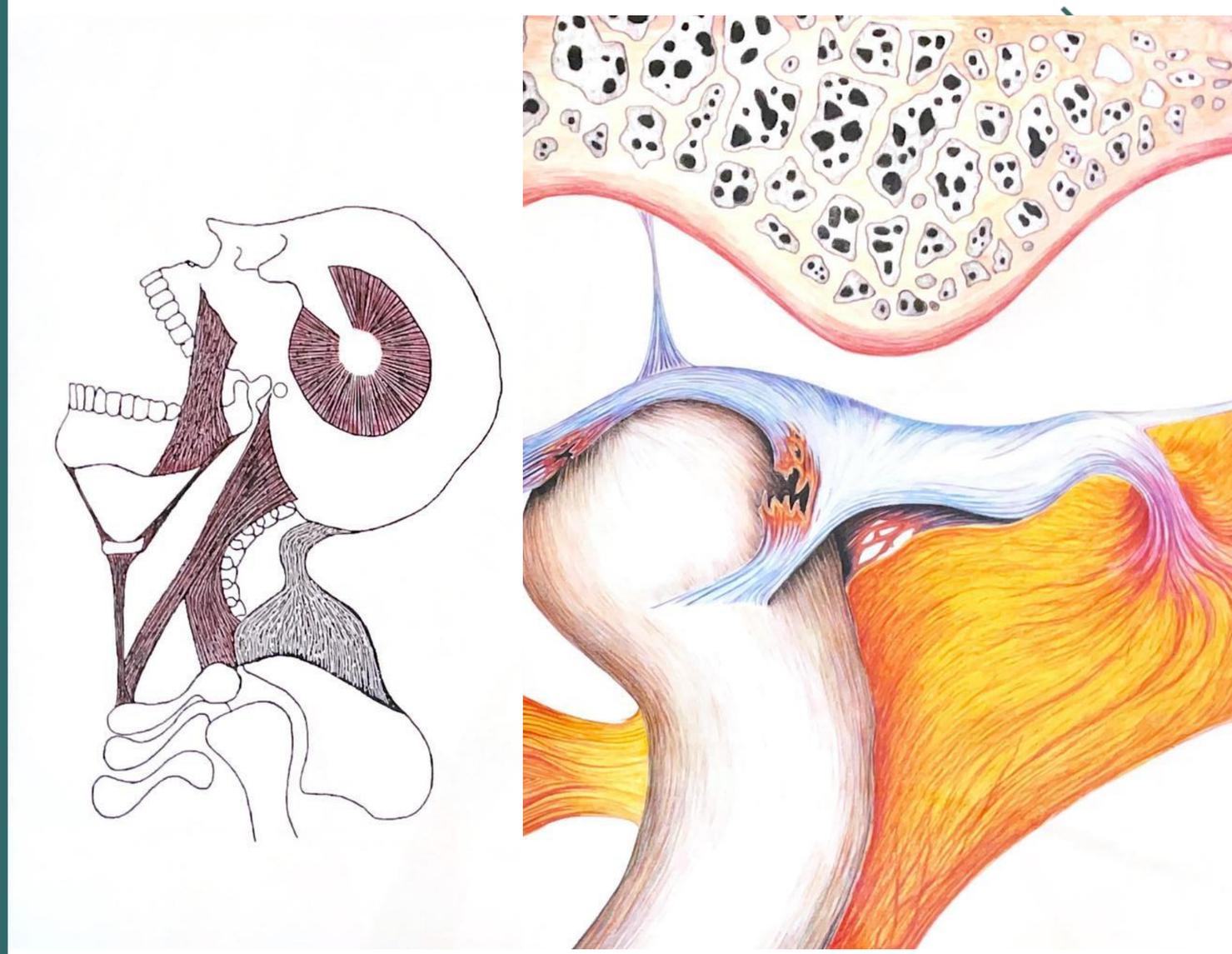
Initial Hit on Car





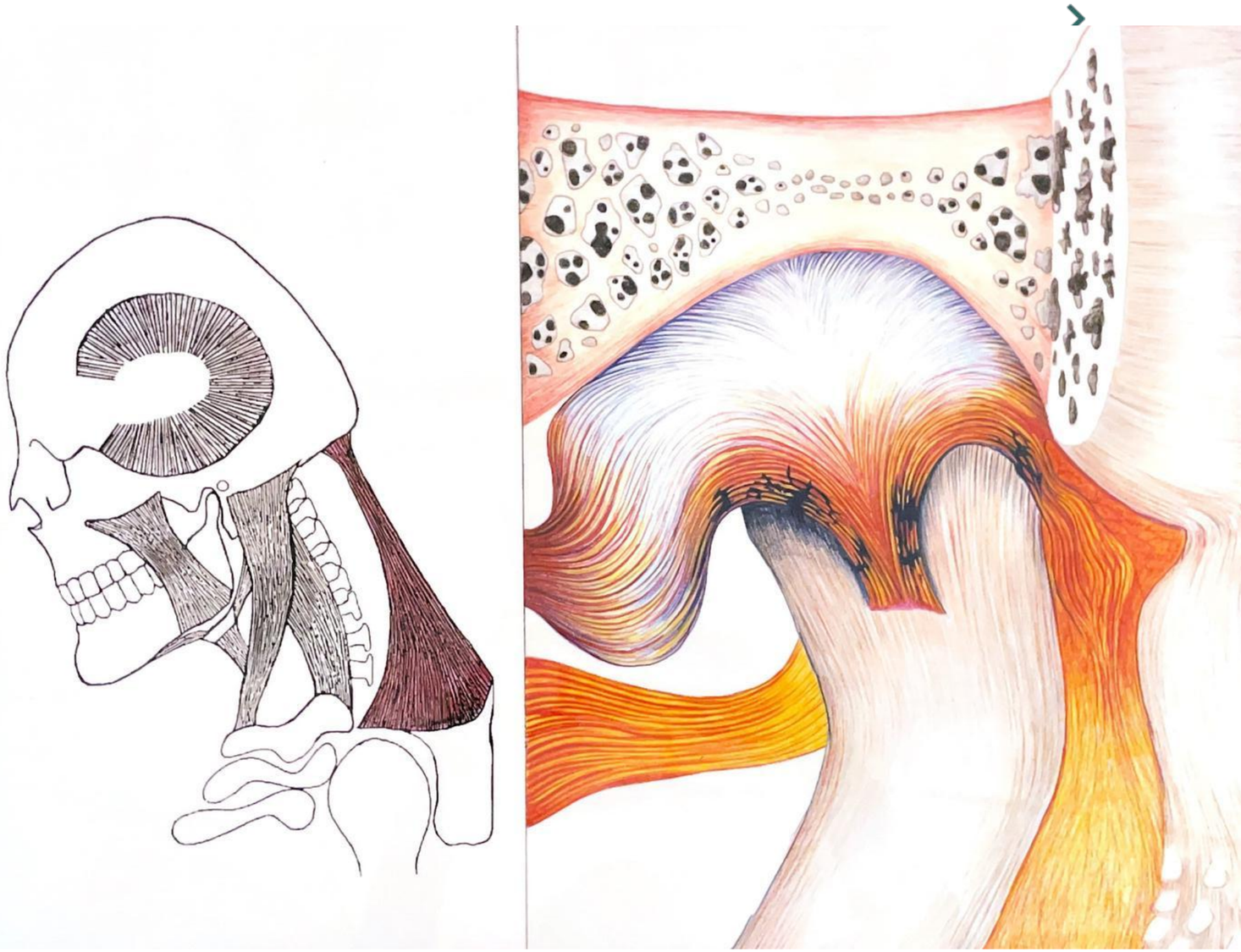
The Biophysio-Mechanics Straight Rear-End Collision

Hyperextension of Hit



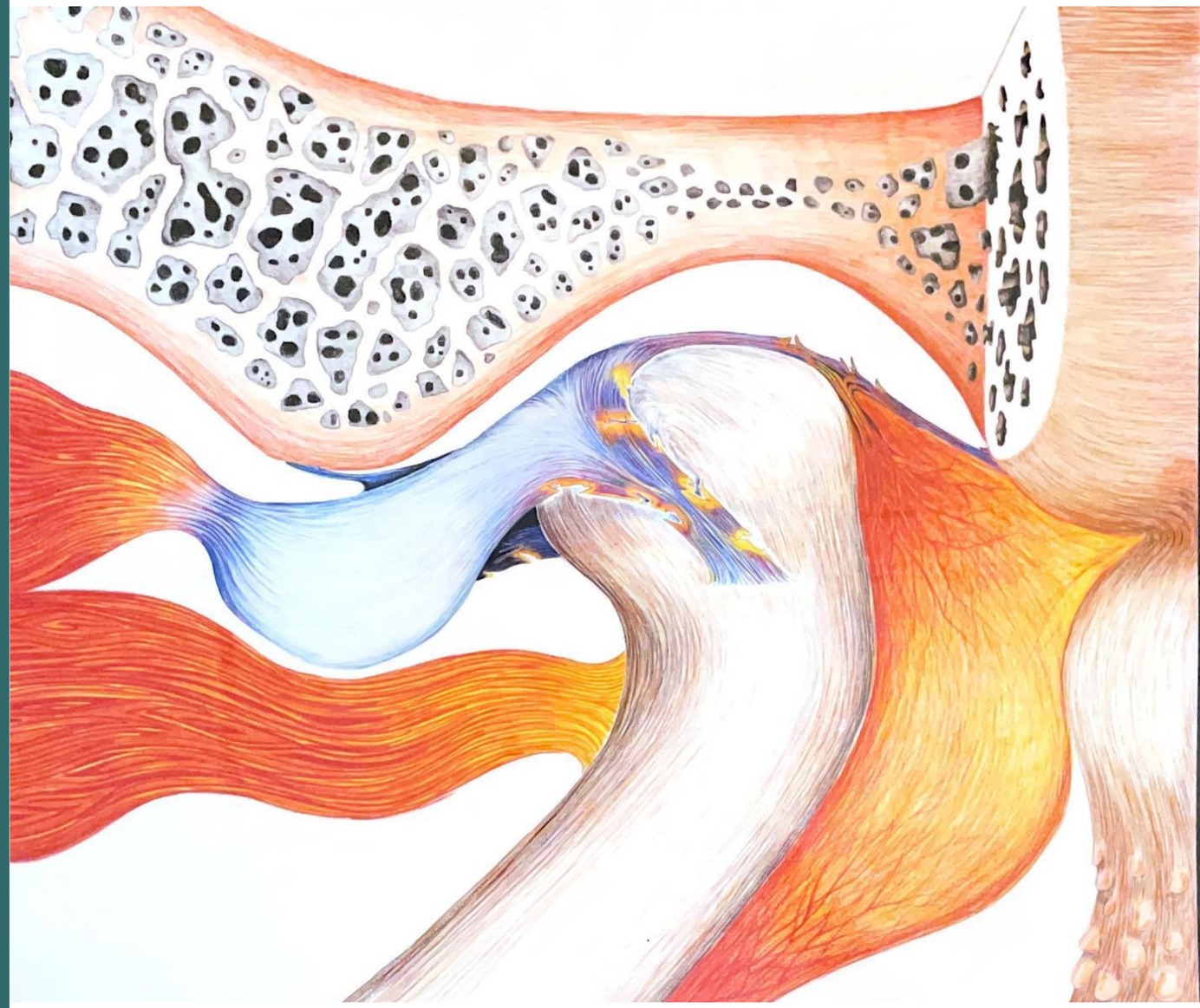
The Biophysio-Mechanics Straight Rear-End Collision

Hyperflexion with Dental Impact



The Biophysio-Mechanics Straight Rear-End Collision

Compromised TMJoint after Hyperextension/Hyperflexion incident with corresponding postural problems



tmj & SLEEP CENTER

PAUL A. INSOLERA,
DDS, FICCMO

drpaul@
tmjpaincenter.com

(608) 833-0865

TMJ Disease

Genetic (Families)

When 6 year molars occlude, they set condylar position.

Cause:

- Deep bites
- Retrussive mandibles

Ortho Discuss

Class II (Div 2) Class III

- Crossbites
- High palates
- Steep mandibular angles
- Airway concerns

Can cause:

- Muscle dysfuntion - whole body
- Insufficient ROM (small mouth)

Those Issues Can Create:

Forward head posture

Even in children

- Swallow dysfunction - breathing - GERD
- Facial pain
- Temporalis pain - temporal headaches
- pain behind eyes, condylar pain (capsulitis)

TMJ Disease

No Diaphramtic breathing

Forward head posture - body follow head

Posterior teeth intruded (clench)

No recruitment for masseters

Temporalis/masseter imbalance

Panorex can reveal

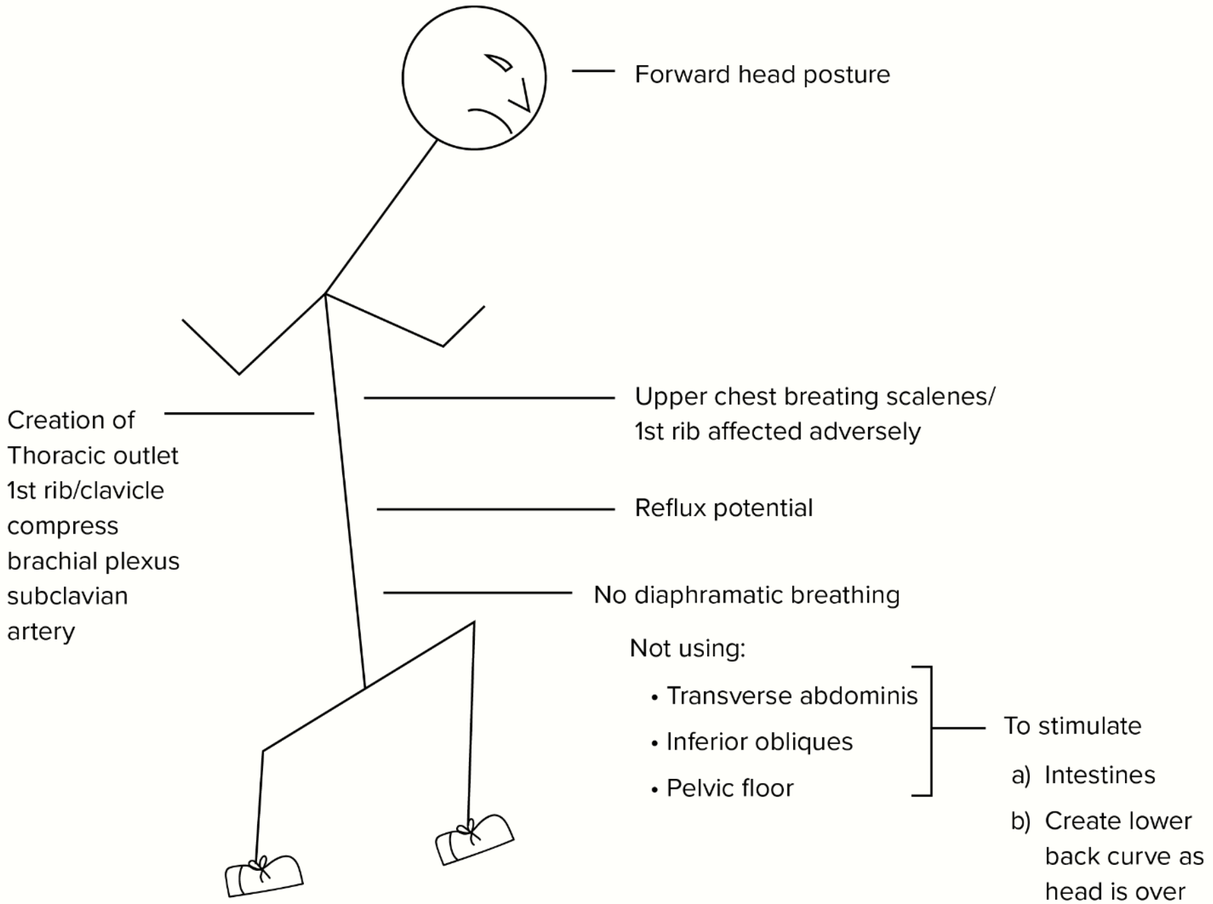
Form follows dysfunction

- High coronoids (attenuated) - temporalis imbalance
- Gonial deposition - masseter clench
- Not diagnostic for condyles/position in fossae

Results of TMJ Disease:

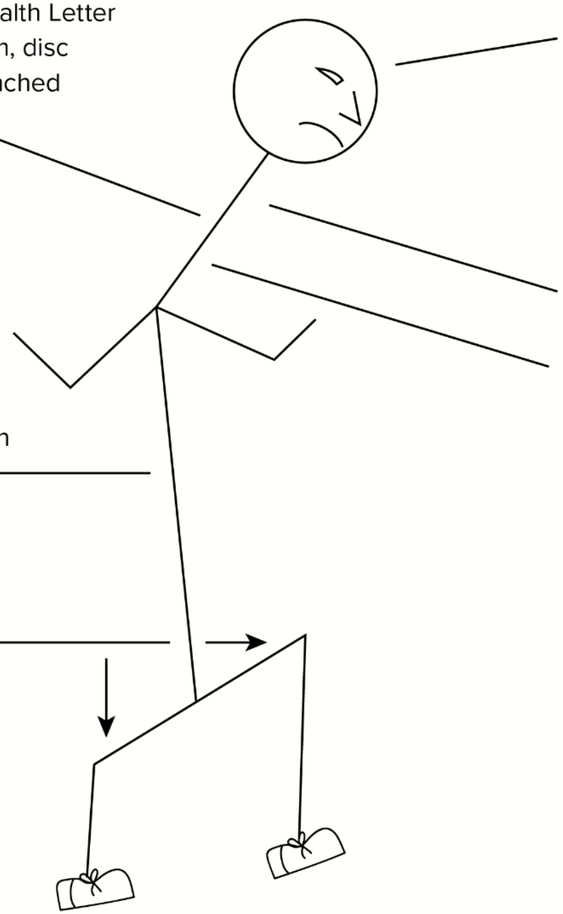
- Intrudes posterior teeth
- 3-Dimensional Intra-oral imbalance
- Condyles move posteriorly, superiorly
- Muscles shorten, head comes forward

FHP, Sleep Apnea, & Posture Concerns



FHP, Sleep Apnea, & Posture Concerns

March 2000 Mayo Clinic Health Letter
"FHP Also leads to myospasm, disc herniations, arthritis, and pinched nerves. Digenerative neck goes hand in hand with balance problems especially in the elderly."



"The body follows the head"

"Therefore the entire body is best aligned by first restoring proper functional alignment to the head."

Enlon - The aiway is the keystone of the face

Hyoid bone only bone not connected to another bone...suspended in throat in 20 muscles.

Disc compression/herniation
Spinal stenosis

Uneven hips short leg
arthritis in hips, knees

Those Issues Can Create:

Thoracic Outlet

- Anterior/Middle scalenes,
- 1st rib raise
- Jaw dysfunction
- Forward head - hand numbness - brachial plexus/subclavian artery impingement

Treatment

TMJ Exam: Tomos each joint

Jaw/head: ROM TMJ locks up cervicals

Soft splints: 2 weeks only- SPLINTS DO NOT CURE

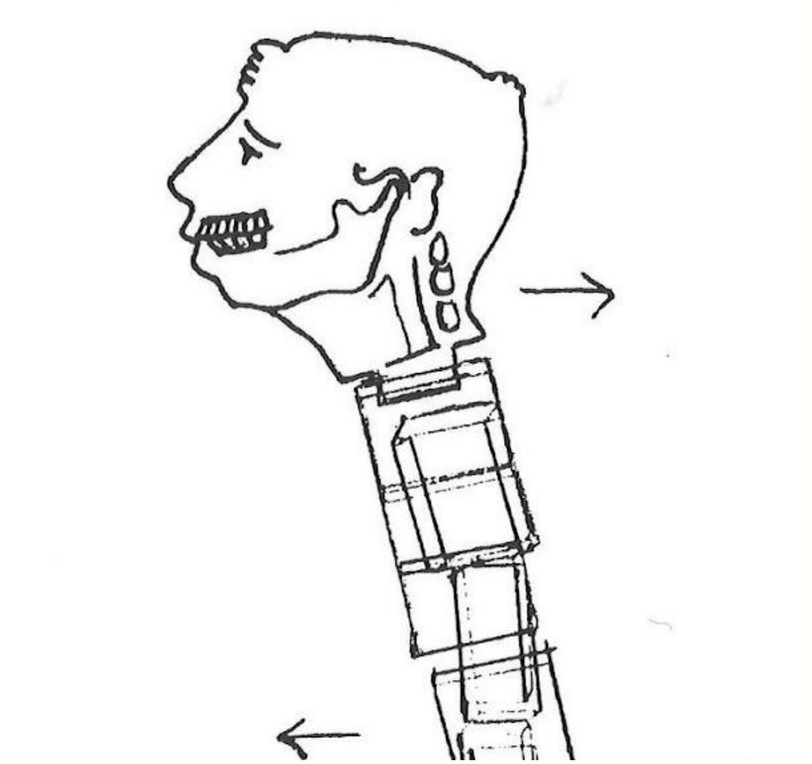
Trigger point: muscles check posture, bite

K7 mytronics

- Simultaneous EMG reading with jaw tracking
- Demonstrates
  - Swallow dysfunction
  - Muscle dysfunction
  - Intra-capsular disorders
  - Lack of muscle recruitment

Treatment is Able To Provide

A neuromuscular bite position with EMG measure to make
a neuromuscular orthotic for optimum 3-dimensional muscle recruitment intra-orally.



INTEGRATE POSTURE WITH BITE

SLEEP APNEA FINDINGS WITH TMJ

Bite change can be seen on orthotic as posture/bite change occur through function.

Neuromuscular Orthotic vs. Splint

Neuromuscular Orthotic

- Not Generic
  - Neuromuscularly derived
  - Tomographically checked
- What does it do?
  - Places condyles in optimum intracapsular position
- Directions
  - Wear 24/7 including eating
    - Muscles have proper ROM (range of motion) and maximize bite recruitment.
    - Condylar position is consistent - no neurovasulcar impingement
    - Appliance taken out for cleaning only!

End Result

Orthotic creates STABLE muscles with proper condylar position. Eventually will eliminate symptoms over time.

Note:

Since the neuromuscular orthotic is functional and places condyles/muscles in proper position it can be considered Physical Therapy for the TMjoints/ muscles. There is nothing you cannot eat with orthotic in place. Joints and muscles are maximized in this functional position!

Neuromuscular Orthotic vs. Splint

Splint

- Generic
  - Not derived neuromusclar
  - Not checked tomographically
- What does it do?
  - Separates upper from lower jaw with artitrary height on acrylic. No muscle/condylar measure.
- Directions
  - Static appliance - used when sleeping
  - IMPORTANT: Patient dysfunctioning all day
  - Appliance NOT protecting patient when they need it most.
  - Does not address Intra & Extra capsular problems
  - Symptoms continue and can get worse!

Note:

Physical therapy exercises for TMjoints

- DO NOT WORK
- TEETH DOMINATE
- Muscle/condyle position

Sooo...No positive results can happen.

SPLINTS CANNOT CURE

Patients on soft foods indefinitely as dysfunction and pain increases!

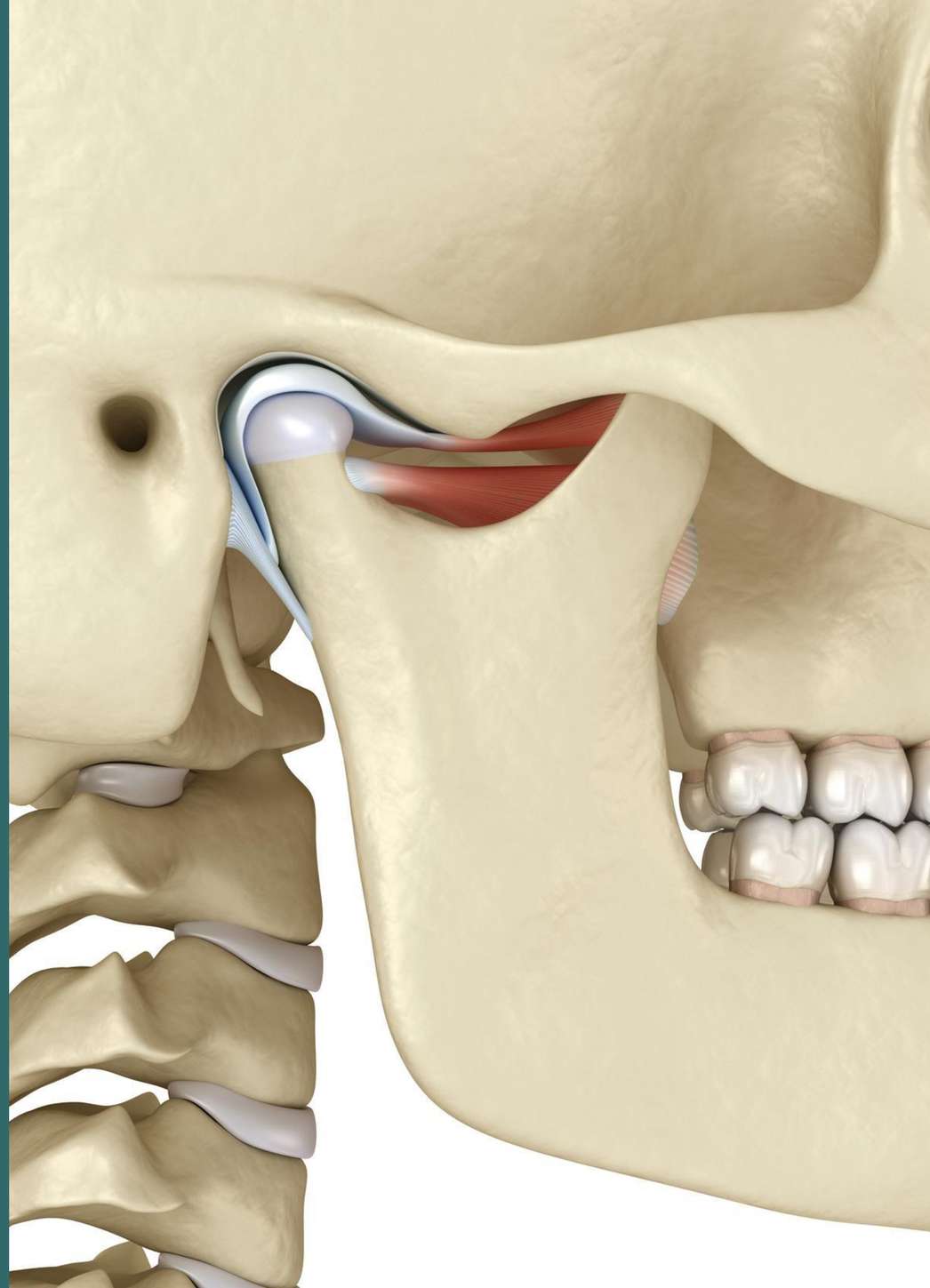
Resources

Myotronics Courses

https://www.myotronics.com/courses

International College of Cranio-Mandibular Orthopedics (ICCMO)

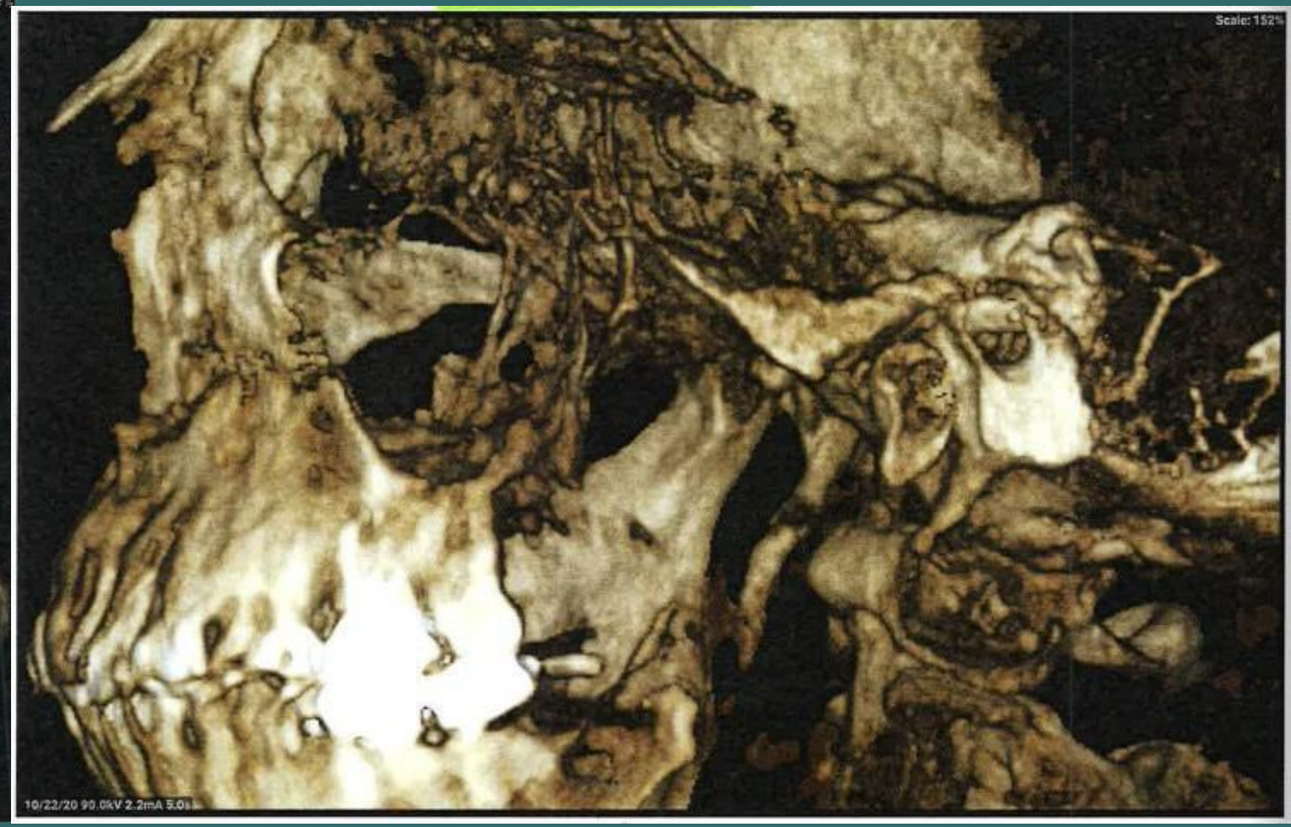
https://iccmo.org/



Bibliography

- John Lennon, BM, MM, C. Norman Shealy MD, Roger K. Cady MD, William Matta PhD, Richard Cox PhD and William F. Simpson PhD
- Postural and Respiratory Modulation of Autonomic Function, Pain & Health. AJPM Vol 4. No 1 January 1994.
- Restak R.M. 1979. The Brain: The Last Frontier NY Warner Books.
- The Laws of Fasciculation Porland's Medical Dictionary. Dorkonos.
- May Clinical Health Letter. March 2000, Vol 18 #3
- Gore DR, Sepic SB, Gardner GM. Roentgenographic findings of the cervical spine in asymptomatic People. Spine 1986; 6: 591-694
- Adams CBT, Logue V. Studies in cervical spondylotic myelopathy part I: movements of the cervical Roots, dura, and cord and their relation to the course of the extrathecal roots. Brain 1971; 94: 557-568.
- -(14) Donatelli R, Wooden M. Orthopedic Physical Therapy New York: Churchill Livingstone Inc.; 1989.
- Cailliet R. Low Back Pain Syndrome. Philadelphia: FA Davis Co., 1981.
- Cailliet R. Soft Tissue Pain and Disability. Philadelphia: FA Davis Co., 1977.
- Reilly B. Practical Strategies in Outpatient Medicine. Philadelphia: WB Saunders Co., 1984.
- Lee D. Principals and practices of muscle energy and functional techniques. In: Grieve GP (ed.) Modern manual Therapy of the Vertebral Column. New York: Churchill Livingstone, 1986.
- Bourdillon JF, Day EA, Bookhout MR. Spinal Manipulation. Oxford: Butterworth-Heinemann, 1991.
- Lewit K. Manipulative Therapy in Rehabilitation of the Locomotor System. Oxford: Butterworth Heinemann, 1991.

Burning Tongue Case

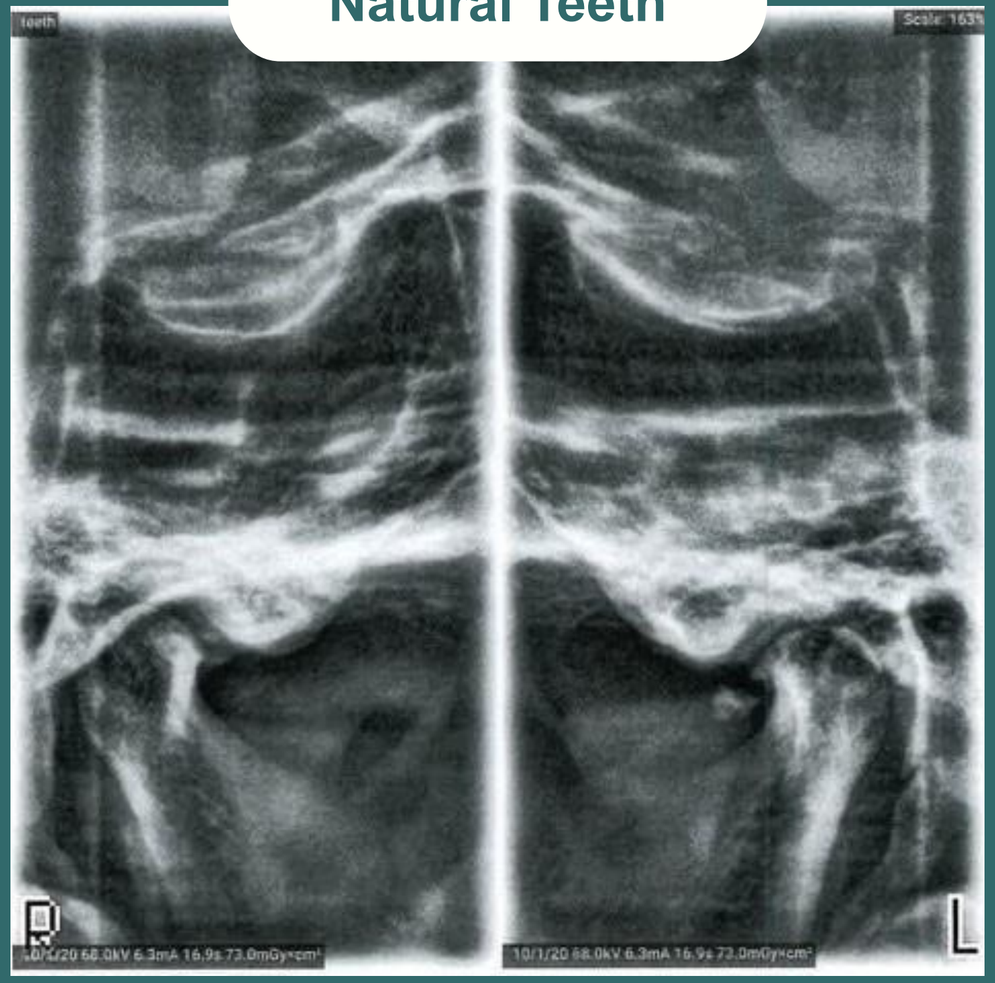


Burning Tongue Case

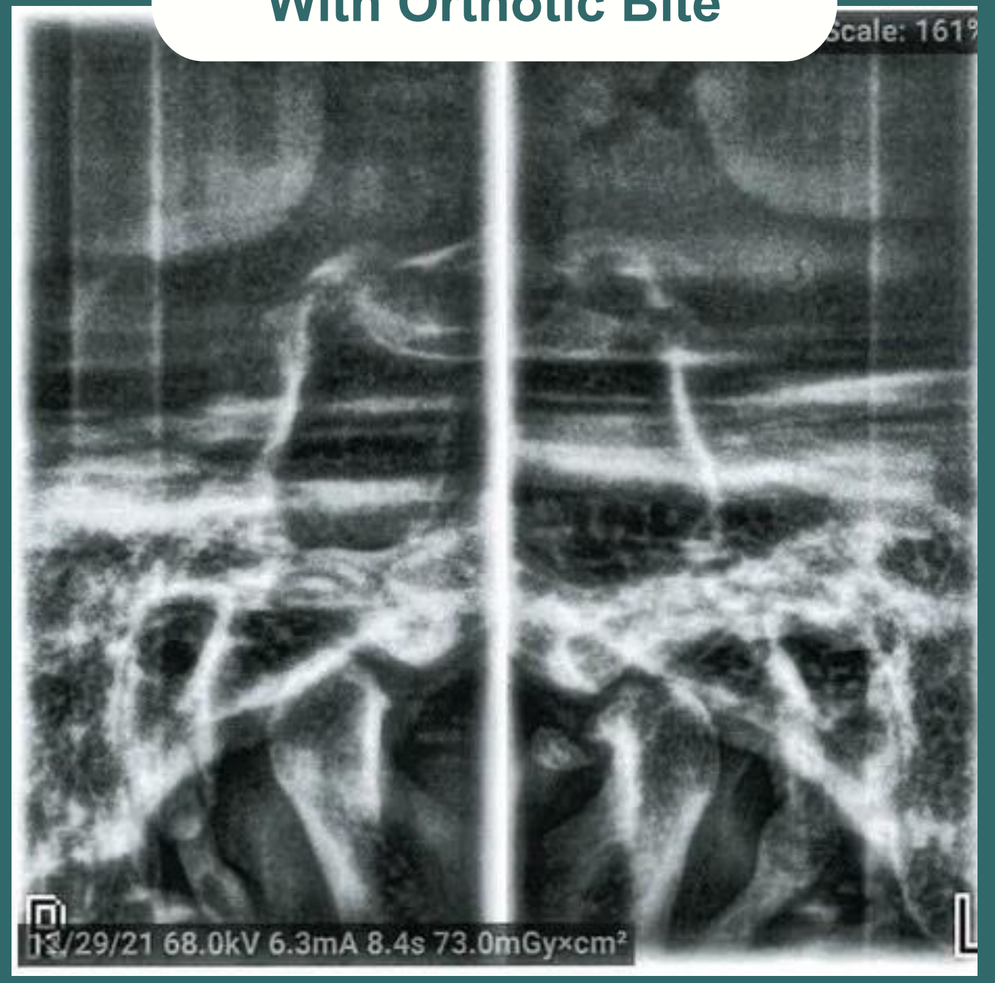
Burning Tongue Case

Burning Tongue Case

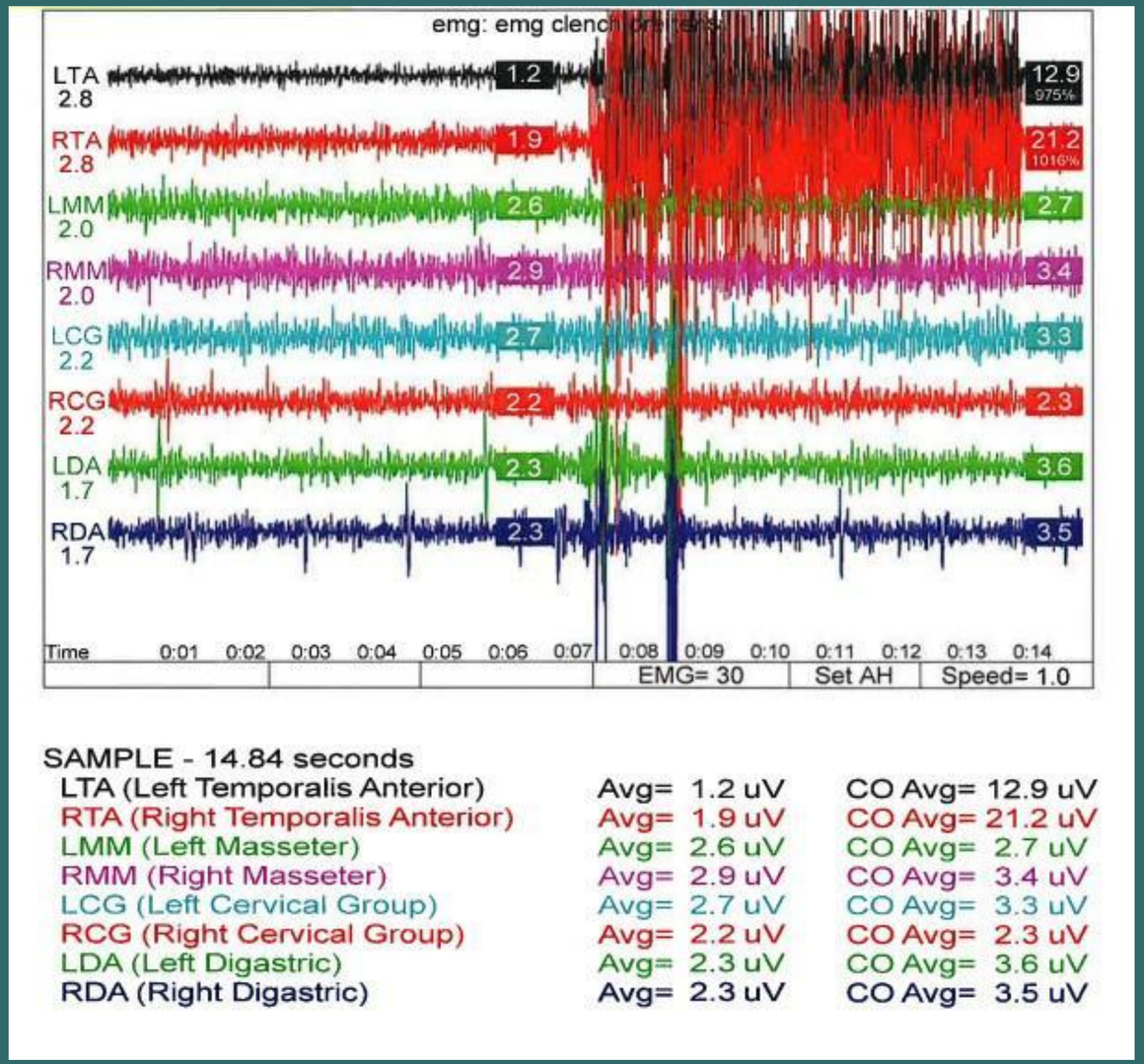
Natural Teeth



With Orthotic Bite



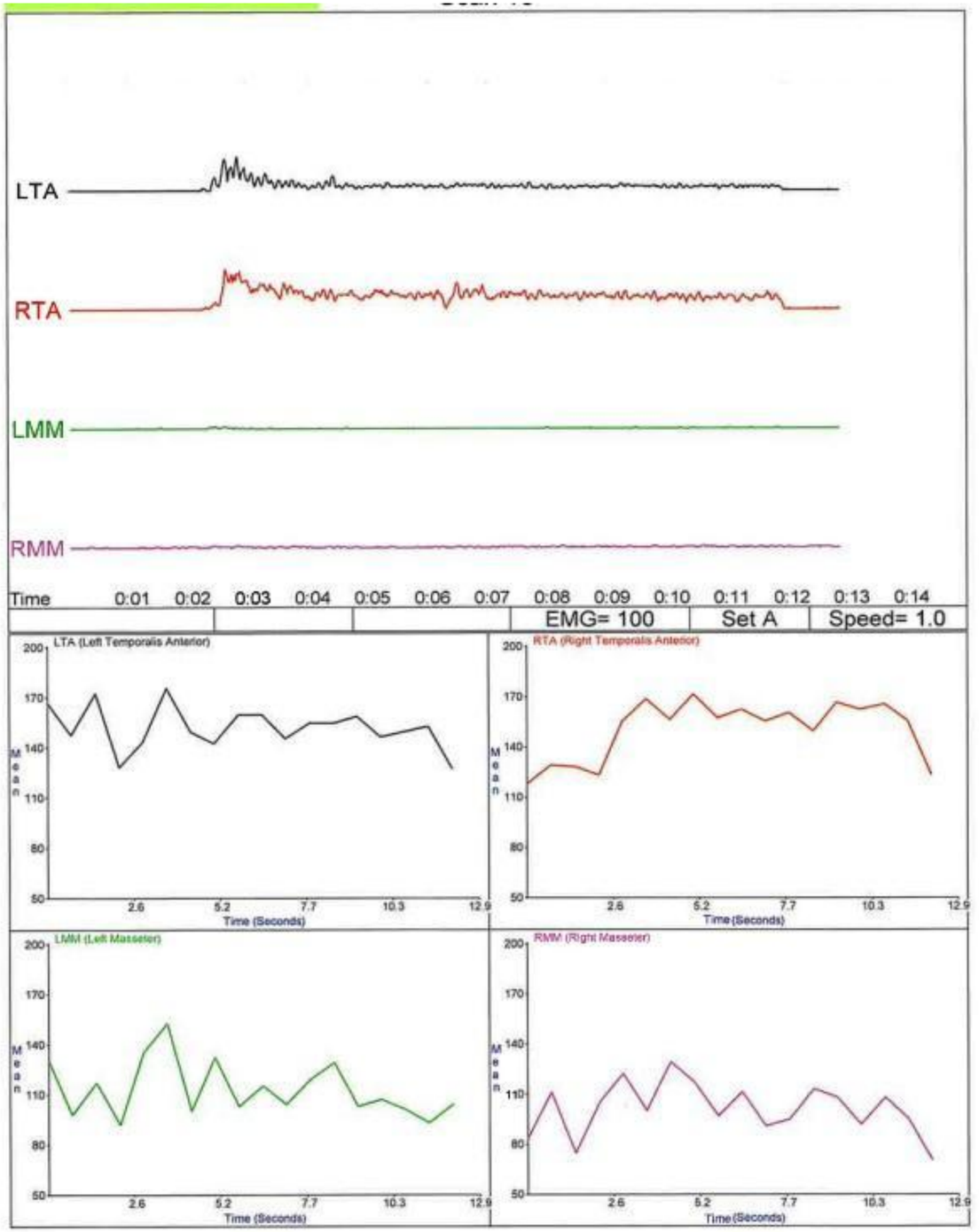
Burning Tongue Case



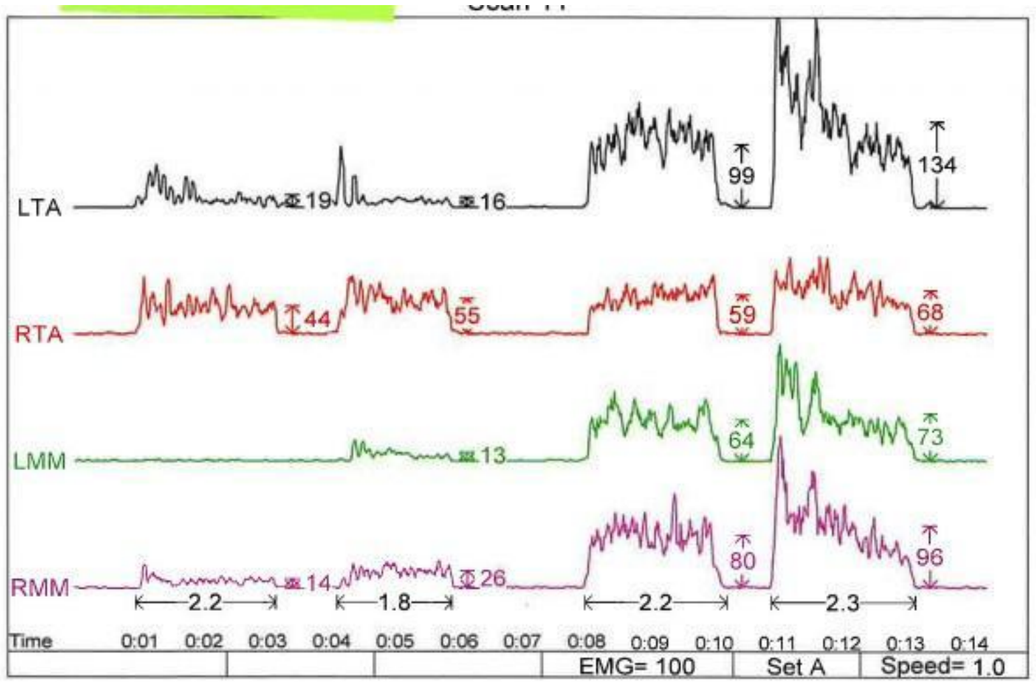
SAMPLE - 14.84 seconds

LTA (Left Temporalis Anterior)	Avg= 1.2 uV	CO Avg= 12.9 uV
RTA (Right Temporalis Anterior)	Avg= 1.9 uV	CO Avg= 21.2 uV
LMM (Left Masseter)	Avg= 2.6 uV	CO Avg= 2.7 uV
RMM (Right Masseter)	Avg= 2.9 uV	CO Avg= 3.4 uV
LCG (Left Cervical Group)	Avg= 2.7 uV	CO Avg= 3.3 uV
RCG (Right Cervical Group)	Avg= 2.2 uV	CO Avg= 2.3 uV
LDA (Left Digastric)	Avg= 2.3 uV	CO Avg= 3.6 uV
RDA (Right Digastric)	Avg= 2.3 uV	CO Avg= 3.5 uV

Burning Tongue Case



Burning Tongue Case



Clench 1 over 2.2 Seconds

LTA	(Left Temporalis Anterior)	Peak= 69 uV,	Average= 19.4 uV
RTA	(Right Temporalis Anterior)	Peak= 89 uV,	Average= 43.7 uV
LMM	(Left Masseter)	Peak= 0 uV,	Average= 0.0 uV
RMM	(Right Masseter)	Peak= 37 uV,	Average= 13.5 uV

Firing Order - LTA RTA RMM

Clench 2 over 1.8 Seconds

LTA	(Left Temporalis Anterior)	Peak= 94 uV,	Average= 15.7 uV
RTA	(Right Temporalis Anterior)	Peak= 90 uV,	Average= 55.2 uV
LMM	(Left Masseter)	Peak= 38 uV,	Average= 13.4 uV
RMM	(Right Masseter)	Peak= 44 uV,	Average= 26.0 uV

Firing Order - LTA RTA RMM LMM

Clench 3 over 2.2 Seconds

LTA	(Left Temporalis Anterior)	Peak= 170 uV,	Average= 98.9 uV
RTA	(Right Temporalis Anterior)	Peak= 98 uV,	Average= 59.3 uV
LMM	(Left Masseter)	Peak= 114 uV,	Average= 63.7 uV
RMM	(Right Masseter)	Peak= 149 uV,	Average= 80.1 uV

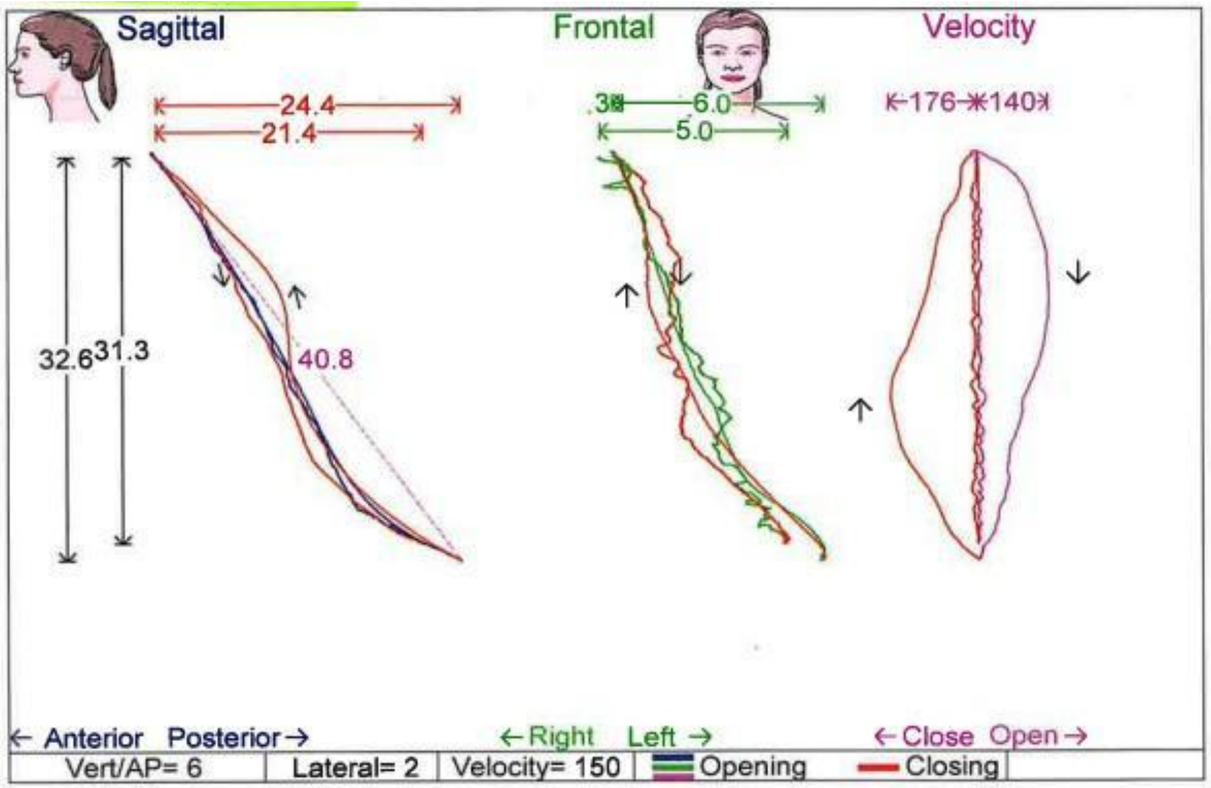
Firing Order - RMM LMM LTA RTA

Clench 4 over 2.3 Seconds

LTA	(Left Temporalis Anterior)	Peak= 339 uV,	Average= 134.5 uV
RTA	(Right Temporalis Anterior)	Peak= 118 uV,	Average= 67.6 uV
LMM	(Left Masseter)	Peak= 189 uV,	Average= 72.9 uV
RMM	(Right Masseter)	Peak= 254 uV,	Average= 96.0 uV

Firing Order - RMM LTA LMM RTA

Burning Tongue Case



********** Opening 1 **********

Opening
- Maximum Velocity = 13.8 mm/sec
- Average Velocity = 3.1 mm/sec

Closing
- Maximum Velocity = 15.0 mm/sec
- Average Velocity = 7.2 mm/sec

Maximum Velocity of Terminal Tooth Contact= 3 mm/sec

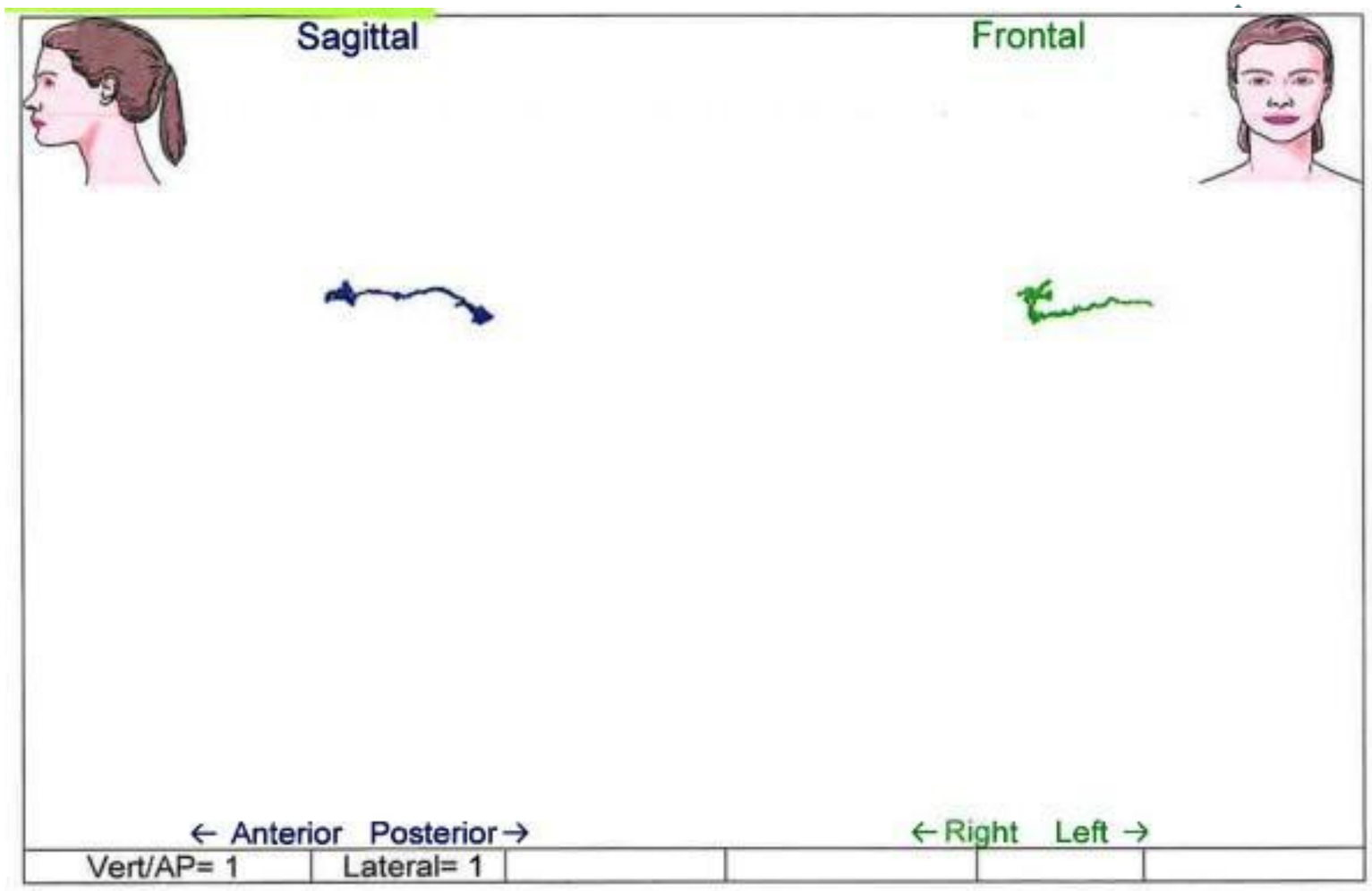
********** Opening 2 **********

Opening
- Maximum Velocity = 140.0 mm/sec
- Average Velocity = 85.2 mm/sec

Closing
- Maximum Velocity = 176.3 mm/sec
- Average Velocity = 104.3 mm/sec

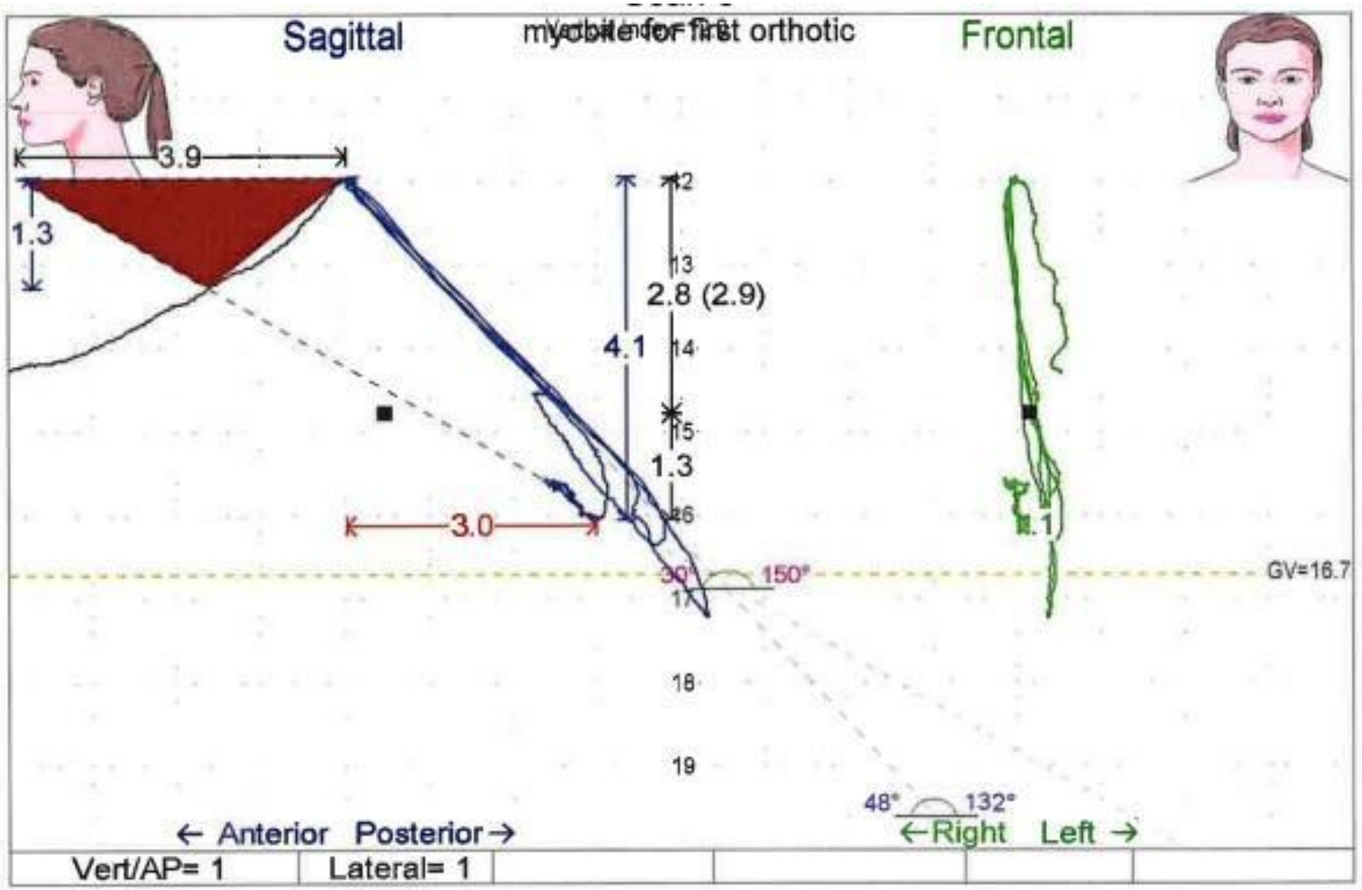
Maximum Velocity of Terminal Tooth Contact= 35 mm/sec

Burning Tongue Case



Patient Swallowed with Teeth Together

Burning Tongue Case



Physiologic Rest is:
- 4.1 mm Inferior to C.O. (Vertical Freeway Space)
- 3.0 mm Posterior to C.O.
- 0.1 mm Left of C.O.

The Myo-trajectory Intersects the Protrusive Border
- 1.3 mm Inferior to C.O.
- 1.6 mm Anterior to C.O.

From Myo-Trajectory to Habitual CO on Horizontal Plane = 3.9 mm

From Initial Tooth Contact to Horizontal Plane of Habitual C.O. as Measured Along the Myo-Trajectory is = 2.6 mm

2.60 Square mm would have to be Ground on the Sagittal Plane to Accommodate Closure to C.O.

MVA/Trigeminal Neuralgia Case

9/6/18

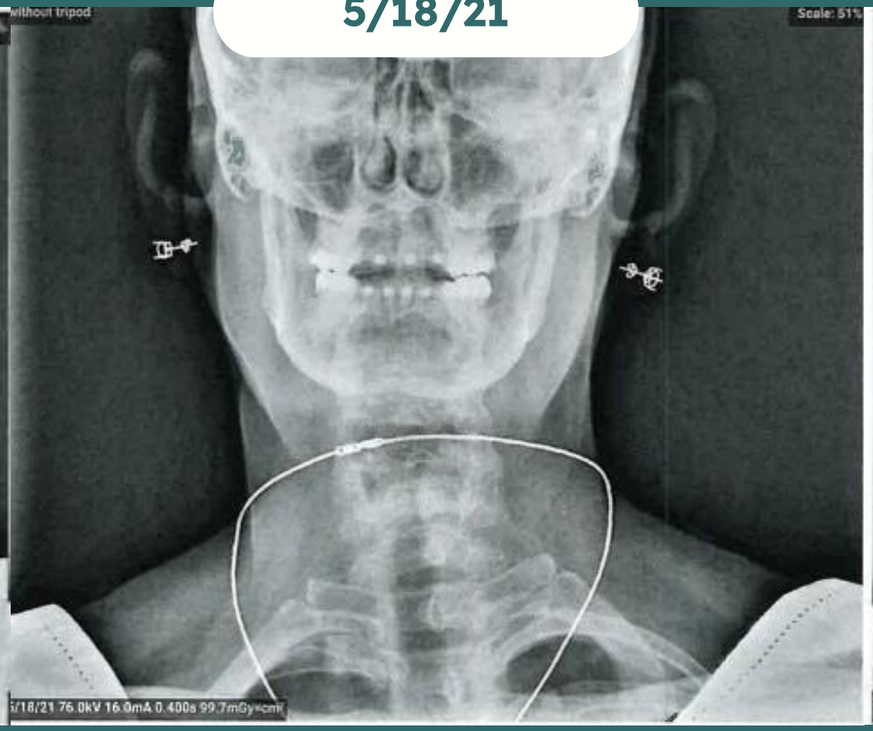
MVA/Trigeminal Neuralgia Case

5/18/21

MVA/Trigeminal Neuralgia Case

9/16/21

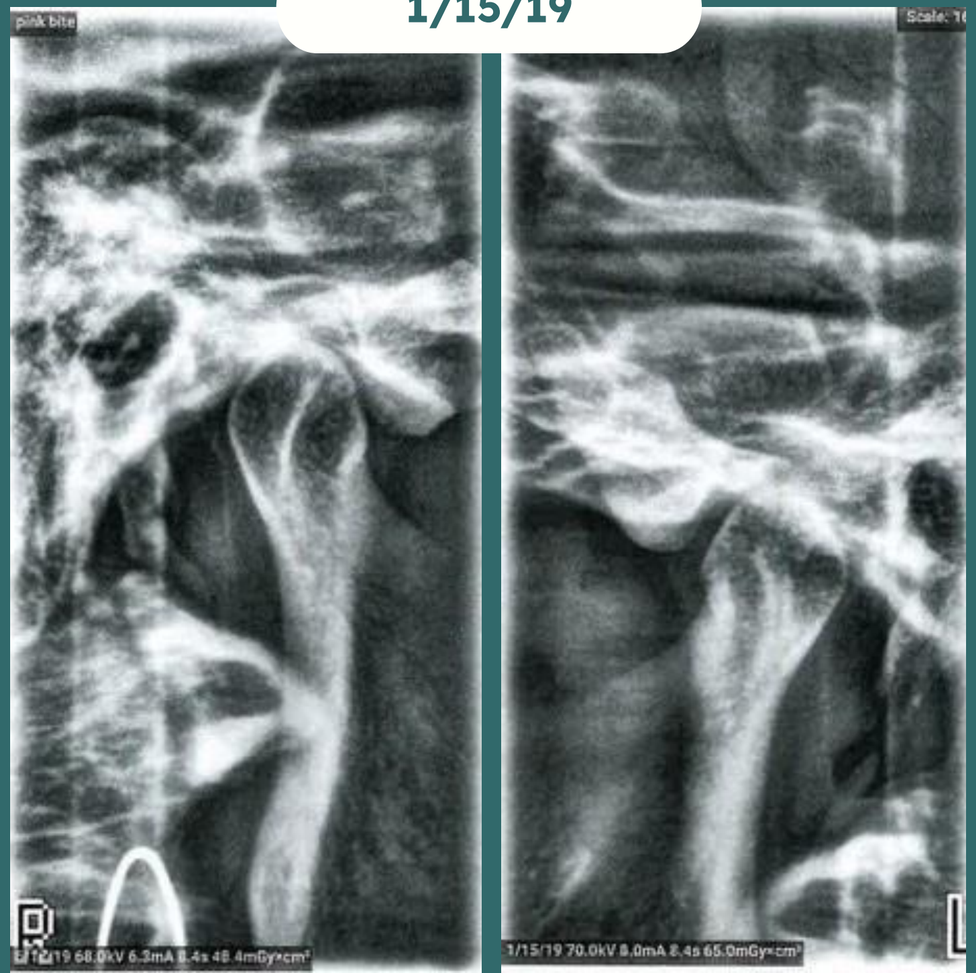
5/18/21



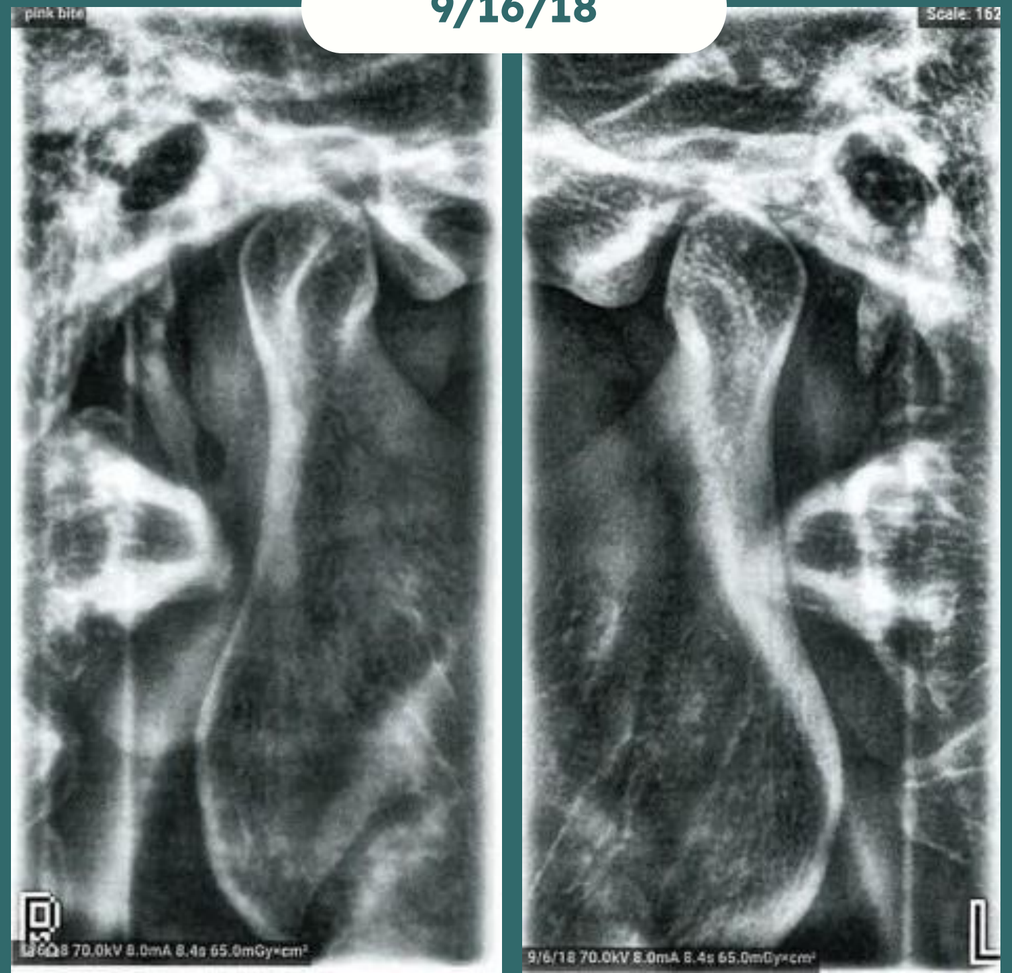
9/6/18

MVA/Trigeminal Neuralgia Case

1/15/19



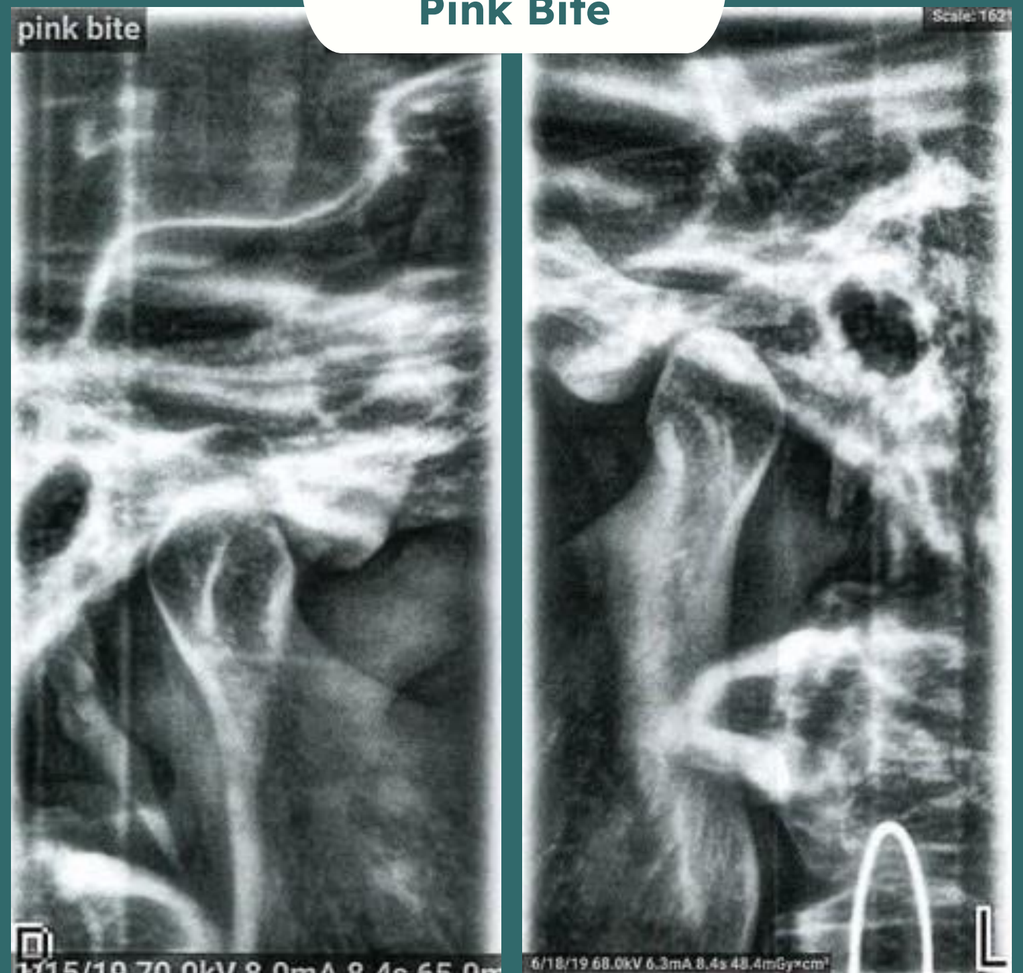
9/16/18



MVA/Trigeminal Neuralgia Case

9/1/20
Pink Bite

6/18/19
Pink Bite



MVA/Trigeminal Neuralgia Case

Left TMJoint
9/6/18

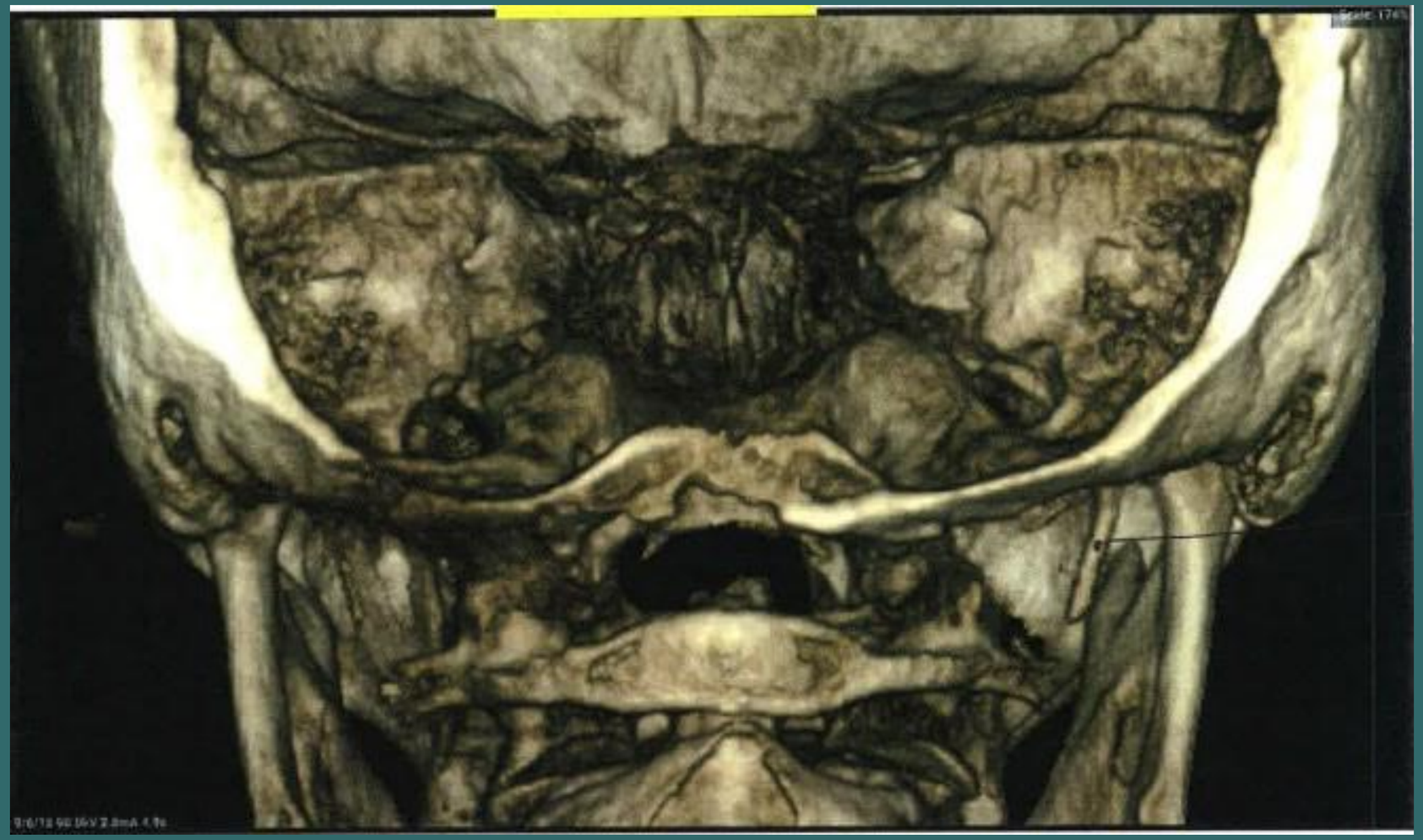
No left stylohoid calcification

MVA/Trigeminal Neuralgia Case

Right Stylohoid Calcification

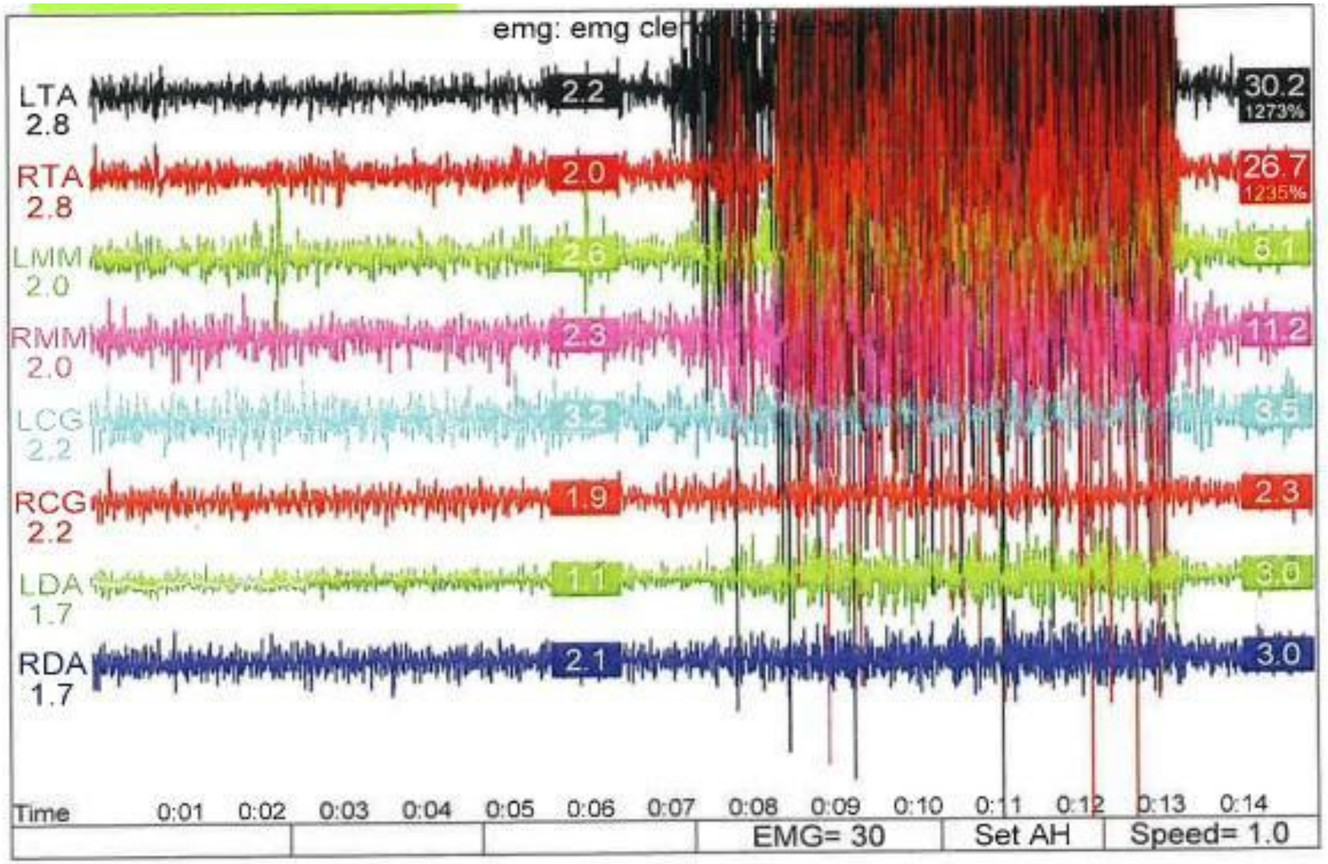
MVA/Trigeminal Neuralgia Case

No left stylohyoid calcification



Right stylohoid calcification

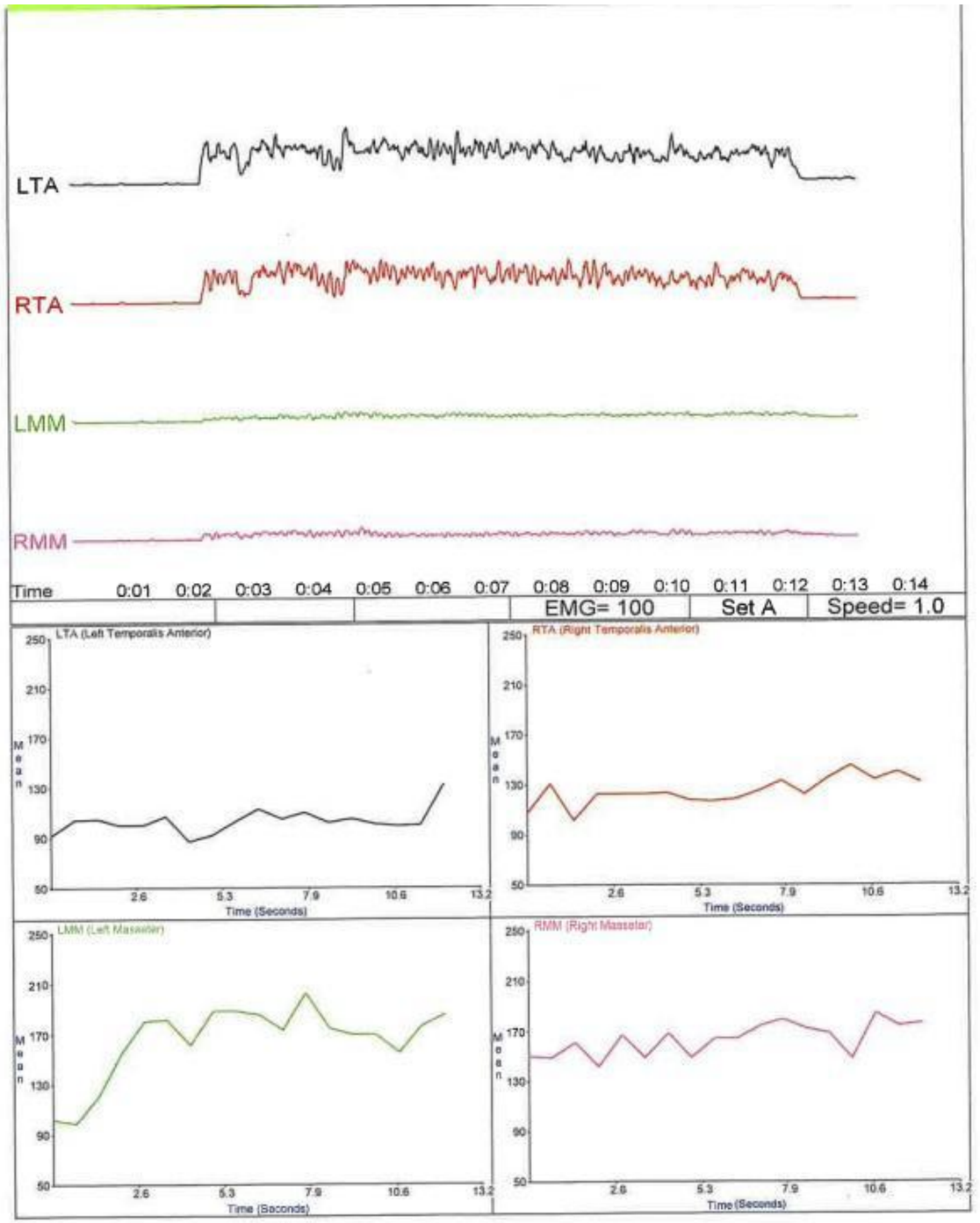
MVA/ Trigeminal Neuralgia Case



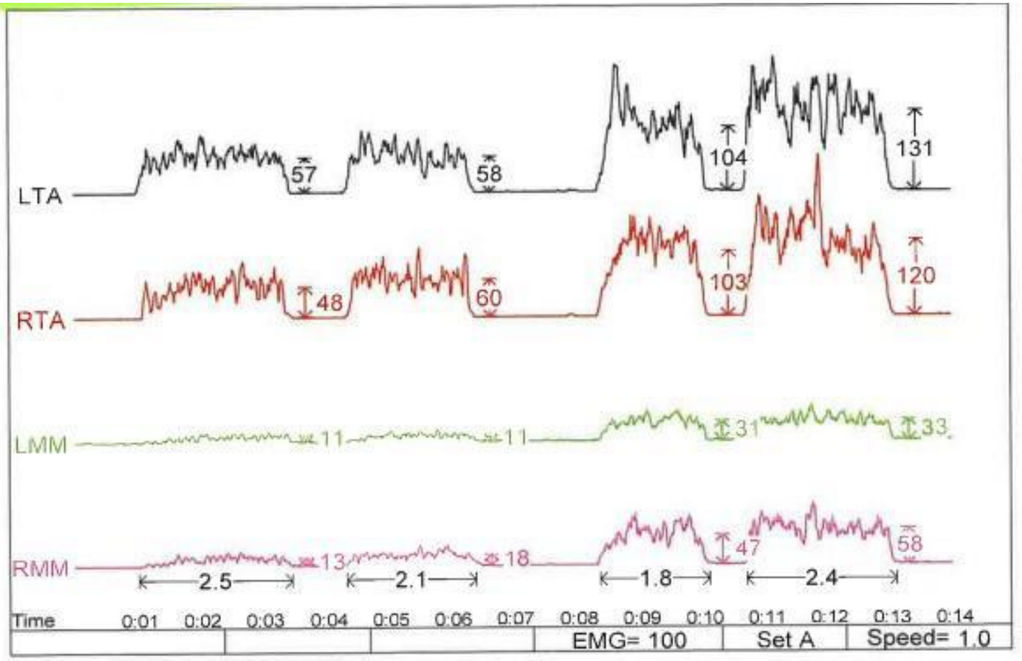
SAMPLE - 14.95 seconds

LTA (Left Temporalis Anterior)	Avg= 2.2 uV	CO Avg= 30.2 uV
RTA (Right Temporalis Anterior)	Avg= 2.0 uV	CO Avg= 26.7 uV
LMM (Left Masseter)	Avg= 2.6 uV	CO Avg= 8.1 uV
RMM (Right Masseter)	Avg= 2.3 uV	CO Avg= 11.2 uV
LCG (Left Cervical Group)	Avg= 3.2 uV	CO Avg= 3.5 uV
RCG (Right Cervical Group)	Avg= 1.9 uV	CO Avg= 2.3 uV
LDA (Left Digastric)	Avg= 1.1 uV	CO Avg= 3.0 uV
RDA (Right Digastric)	Avg= 2.1 uV	CO Avg= 3.0 uV

MVA/ Trigeminal Neuralgia Case



MVA/ Trigeminal Neuralgia Case



Clench 1 over 2.5 Seconds

LTA	(Left Temporalis Anterior)	Peak= 94 uV,	Average= 57.3 uV
RTA	(Right Temporalis Anterior)	Peak= 96 uV,	Average= 48.4 uV
LMM	(Left Masseter)	Peak= 17 uV,	Average= 10.8 uV
RMM	(Right Masseter)	Peak= 23 uV,	Average= 13.1 uV

Firing Order - LTA RTA RMM LMM

Clench 2 over 2.1 Seconds

LTA	(Left Temporalis Anterior)	Peak= 99 uV,	Average= 58.2 uV
RTA	(Right Temporalis Anterior)	Peak= 105 uV,	Average= 60.1 uV
LMM	(Left Masseter)	Peak= 19 uV,	Average= 11.3 uV
RMM	(Right Masseter)	Peak= 35 uV,	Average= 18.4 uV

Firing Order - LTA RTA RMM LMM

Clench 3 over 1.8 Seconds

LTA	(Left Temporalis Anterior)	Peak= 209 uV,	Average= 104.5 uV
RTA	(Right Temporalis Anterior)	Peak= 159 uV,	Average= 102.5 uV
LMM	(Left Masseter)	Peak= 50 uV,	Average= 31.4 uV
RMM	(Right Masseter)	Peak= 82 uV,	Average= 47.4 uV

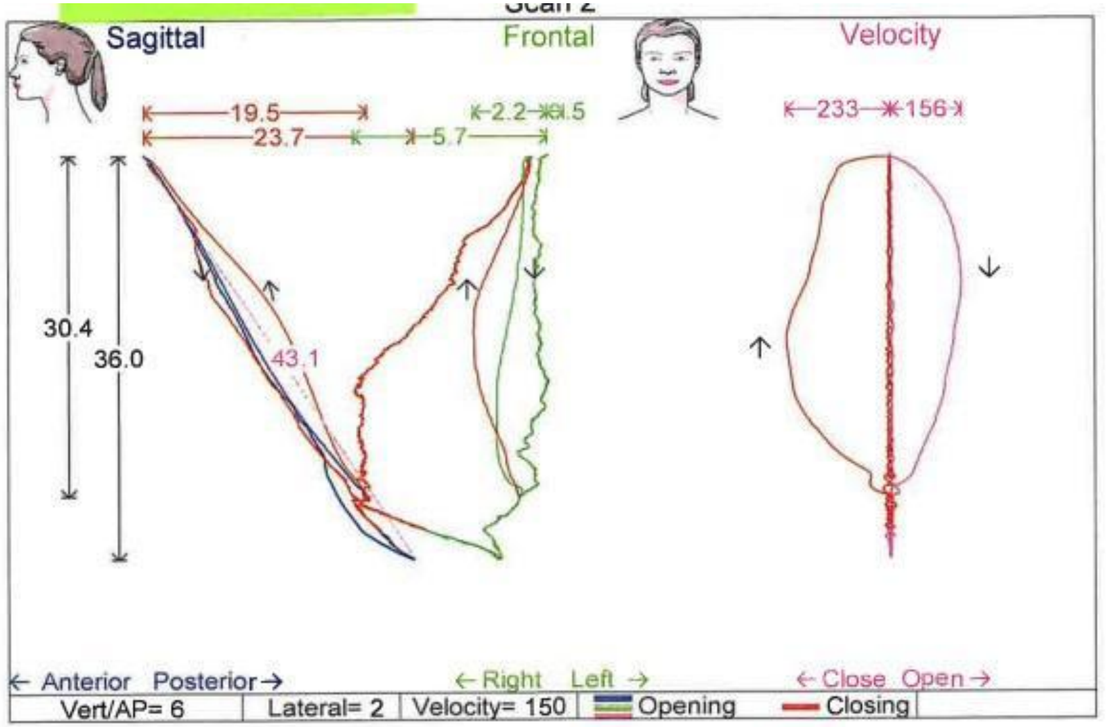
Firing Order - LTA RMM RTA LMM

Clench 4 over 2.4 Seconds

LTA	(Left Temporalis Anterior)	Peak= 218 uV,	Average= 130.5 uV
RTA	(Right Temporalis Anterior)	Peak= 260 uV,	Average= 120.0 uV
LMM	(Left Masseter)	Peak= 57 uV,	Average= 33.1 uV
RMM	(Right Masseter)	Peak= 99 uV,	Average= 58.4 uV

Firing Order - LTA RTA RMM LMM

MVA/ Trigeminal Neuralgia Case



********** Opening 1 **********

Opening
- Maximum Velocity = 12.5 mm/sec
- Average Velocity = 1.8 mm/sec

Closing
- Maximum Velocity = 16.3 mm/sec
- Average Velocity = 3.6 mm/sec

Maximum Velocity of Terminal Tooth Contact= 3 mm/sec

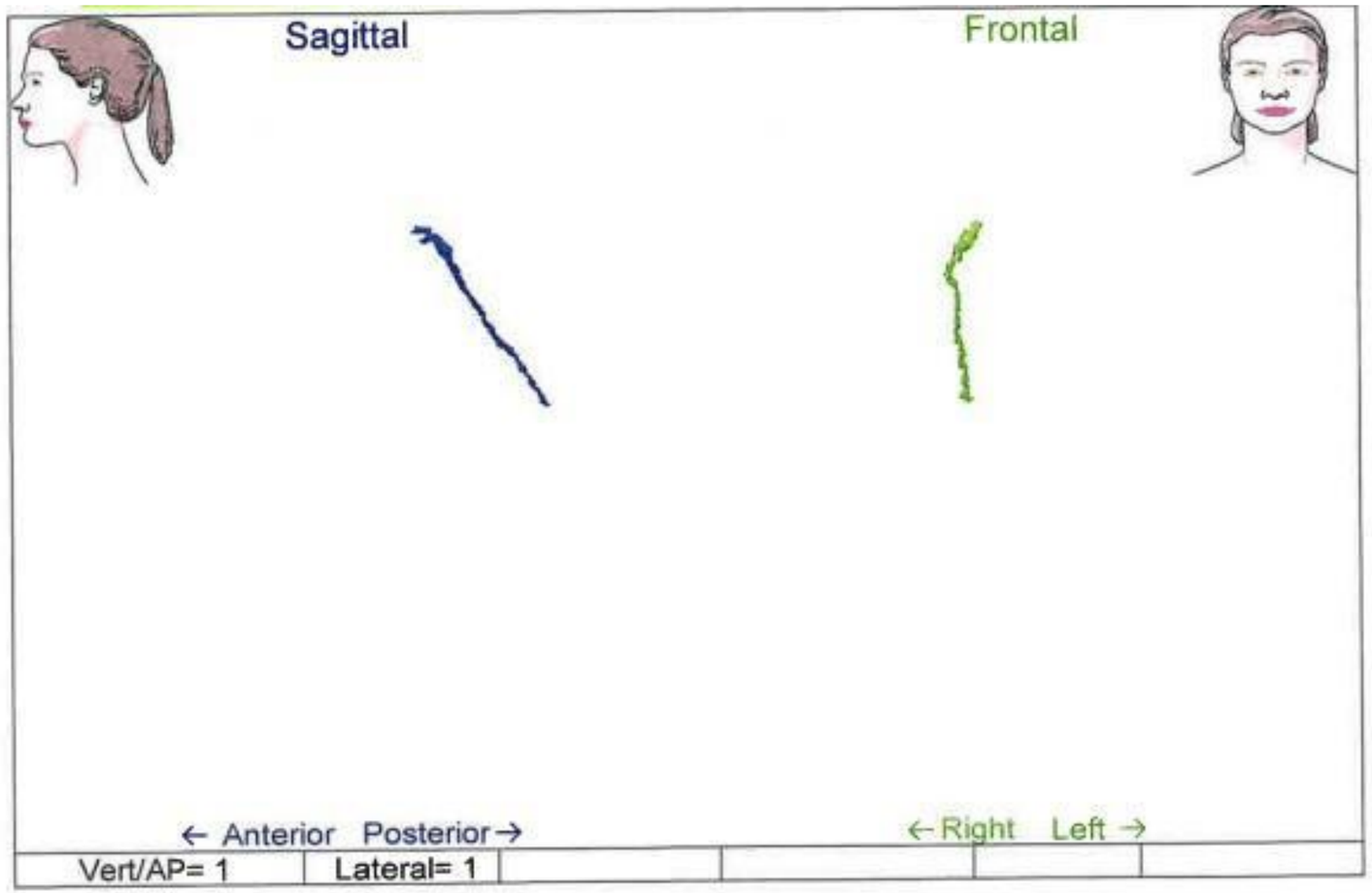
********** Opening 2 **********

Opening
- Maximum Velocity = 156.3 mm/sec
- Average Velocity = 103.8 mm/sec

Closing
- Maximum Velocity = 232.5 mm/sec
- Average Velocity = 167.6 mm/sec

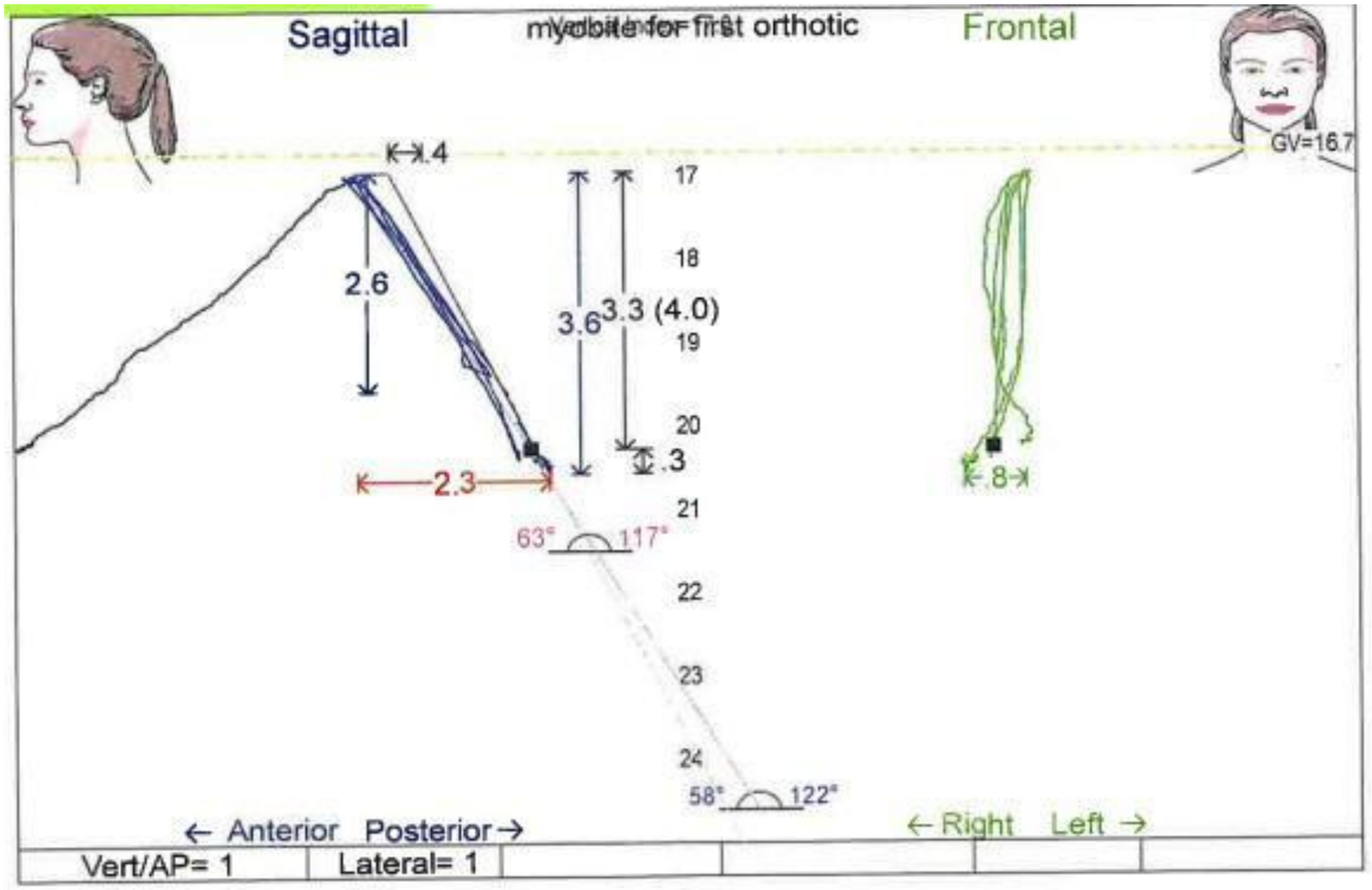
Maximum Velocity of Terminal Tooth Contact= 118 mm/sec

MVA/ Trigeminal Neural Case



Patient Swallowed with Teeth Together

MVA/ Trigeminal Neural Case



Physiologic Rest is:
- 3.6 mm Inferior to C.O. (Vertical Freeway Space)
- 2.3 mm Posterior to C.O.
- 0.8 mm Right of C.O.

The Myo-trajectory Intersects the Protrusive Border
- 2.6 mm Inferior to C.O.
- 1.8 mm Posterior to C.O.

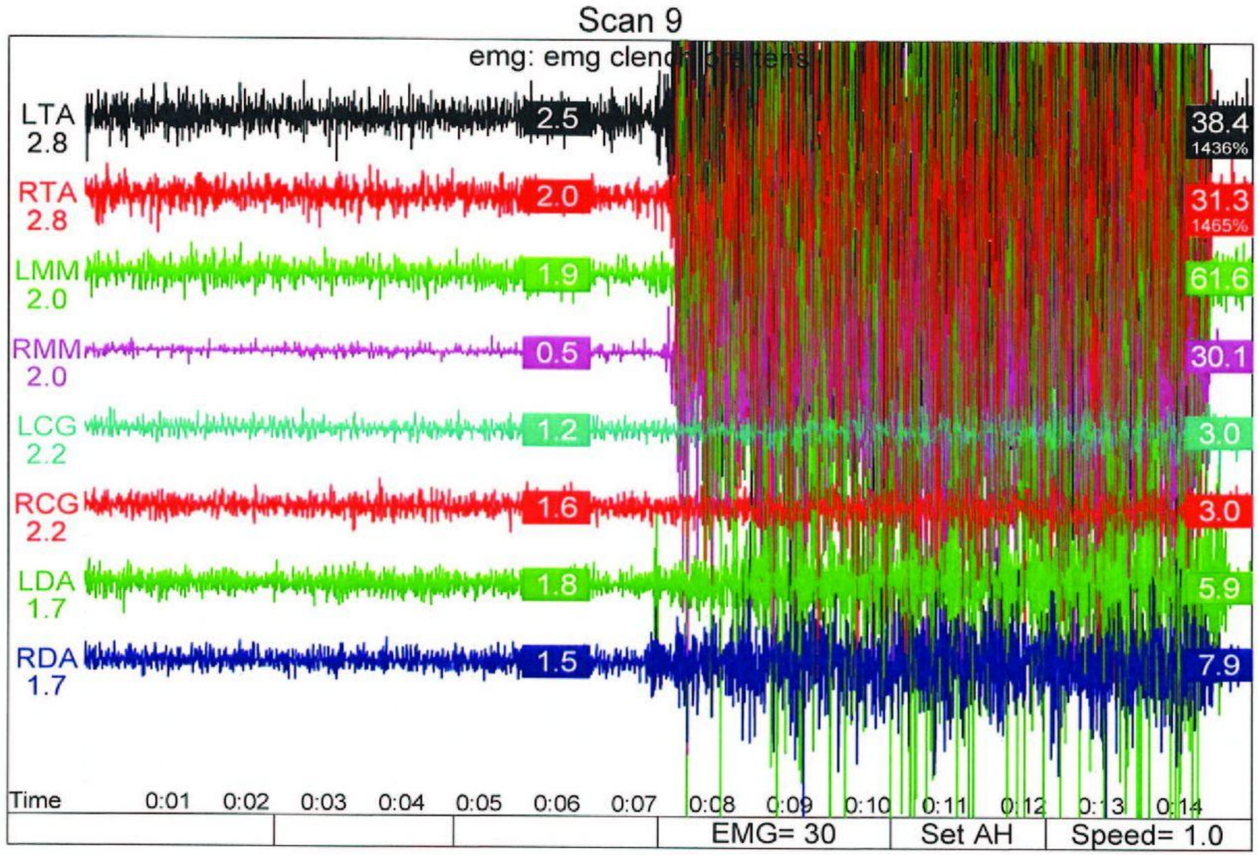
From Myo-Trajectory to Habitual CO on Horizontal Plane = 0.4 mm

From Initial Tooth Contact to Horizontal Plane of Habitual C.O. as Measured Along the Myo-Trajectory is = 3.4 mm

0.52 Square mm would have to be Ground on the Sagittal Plane to Accommodate Closure to C.O.

Azia Case

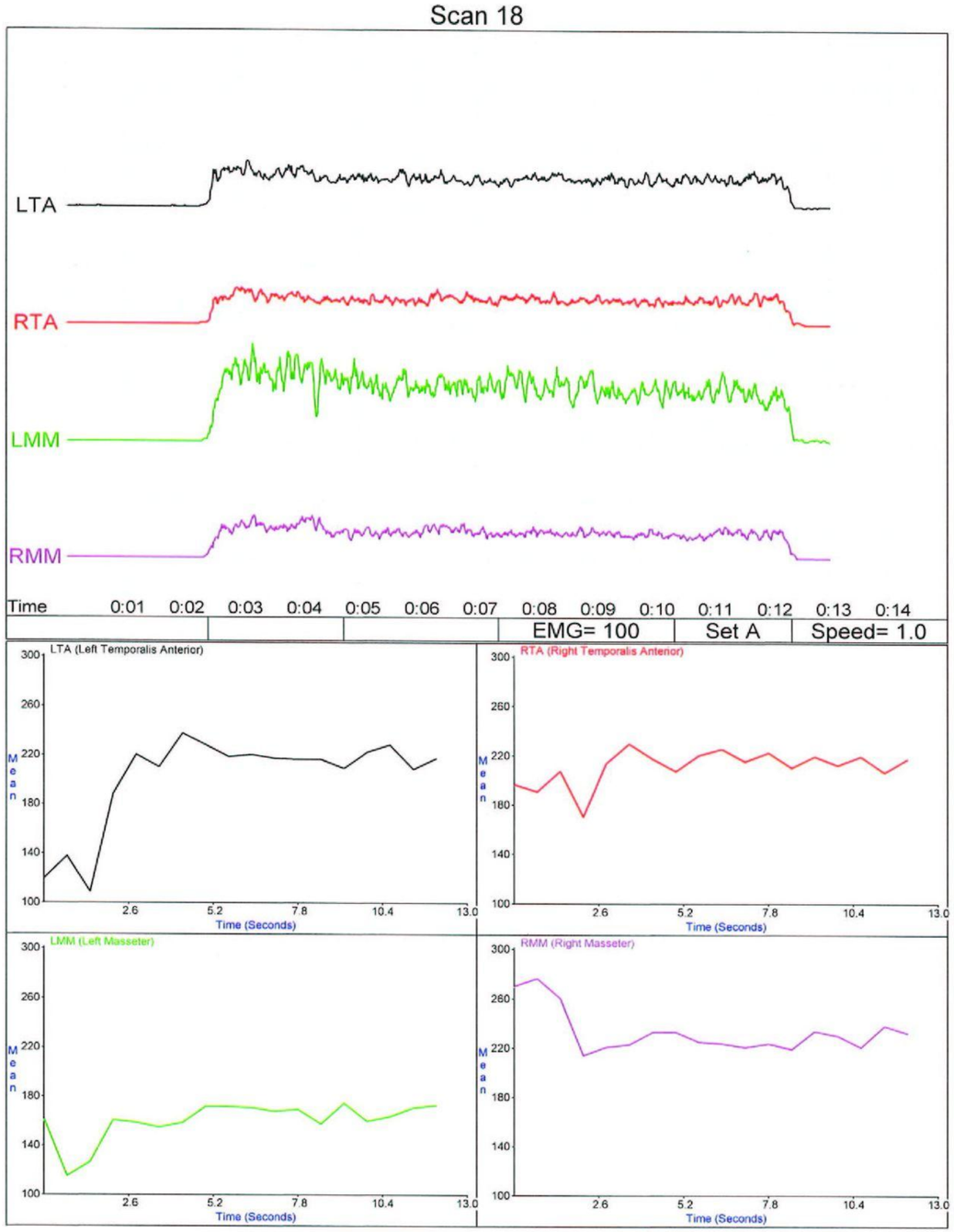
Azia Case



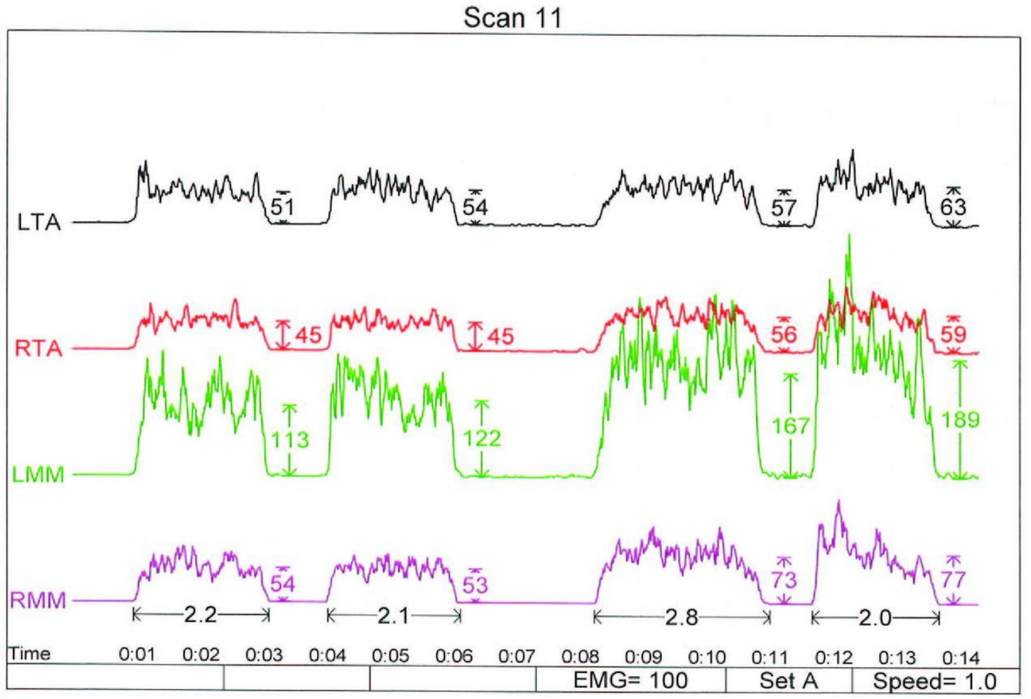
SAMPLE - 15.00 seconds

LTA (Left Temporalis Anterior)	Avg= 2.5 uV	CO Avg= 38.4 uV
RTA (Right Temporalis Anterior)	Avg= 2.0 uV	CO Avg= 31.3 uV
LMM (Left Masseter)	Avg= 1.9 uV	CO Avg= 61.6 uV
RMM (Right Masseter)	Avg= 0.5 uV	CO Avg= 30.1 uV
LCG (Left Cervical Group)	Avg= 1.2 uV	CO Avg= 3.0 uV
RCG (Right Cervical Group)	Avg= 1.6 uV	CO Avg= 3.0 uV
LDA (Left Digastric)	Avg= 1.8 uV	CO Avg= 5.9 uV
RDA (Right Digastric)	Avg= 1.5 uV	CO Avg= 7.9 uV

Azia Case


Scan 18
LTA
RTA
LMM
RMM
Time 0:01 0:02 0:03 0:04 0:05 0:06 0:07 0:08 0:09 0:10 0:11 0:12 0:13 0:14
EMG= 100
Set A
Speed= 1.0
LTA (Left Temporalis Anterior)
RTA (Right Temporalis Anterior)
LMM (Left Masseter)
RMM (Right Masseter)
Mean
Time (Seconds)

Azia Case



Clench 1 over 2.2 Seconds

LTA	(Left Temporalis Anterior)	Peak= 99 uV,	Average= 50.5 uV
RTA	(Right Temporalis Anterior)	Peak= 81 uV,	Average= 44.6 uV
LMM	(Left Masseter)	Peak= 195 uV,	Average= 112.5 uV
RMM	(Right Masseter)	Peak= 89 uV,	Average= 54.2 uV

Firing Order - LTA RTA LMM RMM

Clench 2 over 2.1 Seconds

LTA	(Left Temporalis Anterior)	Peak= 86 uV,	Average= 54.3 uV
RTA	(Right Temporalis Anterior)	Peak= 67 uV,	Average= 44.9 uV
LMM	(Left Masseter)	Peak= 198 uV,	Average= 121.7 uV
RMM	(Right Masseter)	Peak= 77 uV,	Average= 52.8 uV

Firing Order - LTA LMM RMM RTA

Clench 3 over 2.8 Seconds

LTA	(Left Temporalis Anterior)	Peak= 94 uV,	Average= 57.3 uV
RTA	(Right Temporalis Anterior)	Peak= 89 uV,	Average= 55.7 uV
LMM	(Left Masseter)	Peak= 299 uV,	Average= 166.6 uV
RMM	(Right Masseter)	Peak= 125 uV,	Average= 73.4 uV

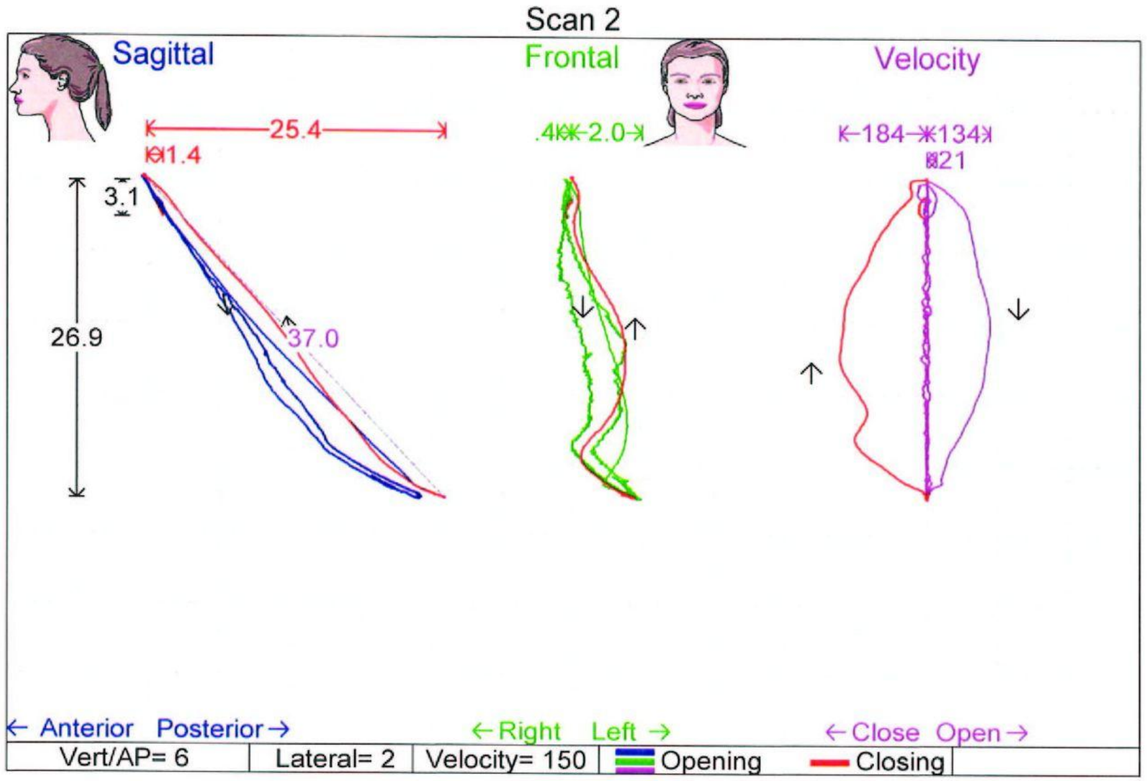
Firing Order - LMM LTA RTA RMM

Clench 4 over 2.0 Seconds

LTA	(Left Temporalis Anterior)	Peak= 124 uV,	Average= 62.8 uV
RTA	(Right Temporalis Anterior)	Peak= 106 uV,	Average= 59.0 uV
LMM	(Left Masseter)	Peak= 410 uV,	Average= 189.2 uV
RMM	(Right Masseter)	Peak= 158 uV,	Average= 77.1 uV

Firing Order - LMM RTA RMM LTA

Azia Case



********** Opening 1 **********

Opening
- Maximum Velocity = 21.3 mm/sec
- Average Velocity = 12.2 mm/sec

Closing
- Maximum Velocity = 16.3 mm/sec
- Average Velocity = 13.0 mm/sec

Maximum Velocity of Terminal Tooth Contact= 0 mm/sec

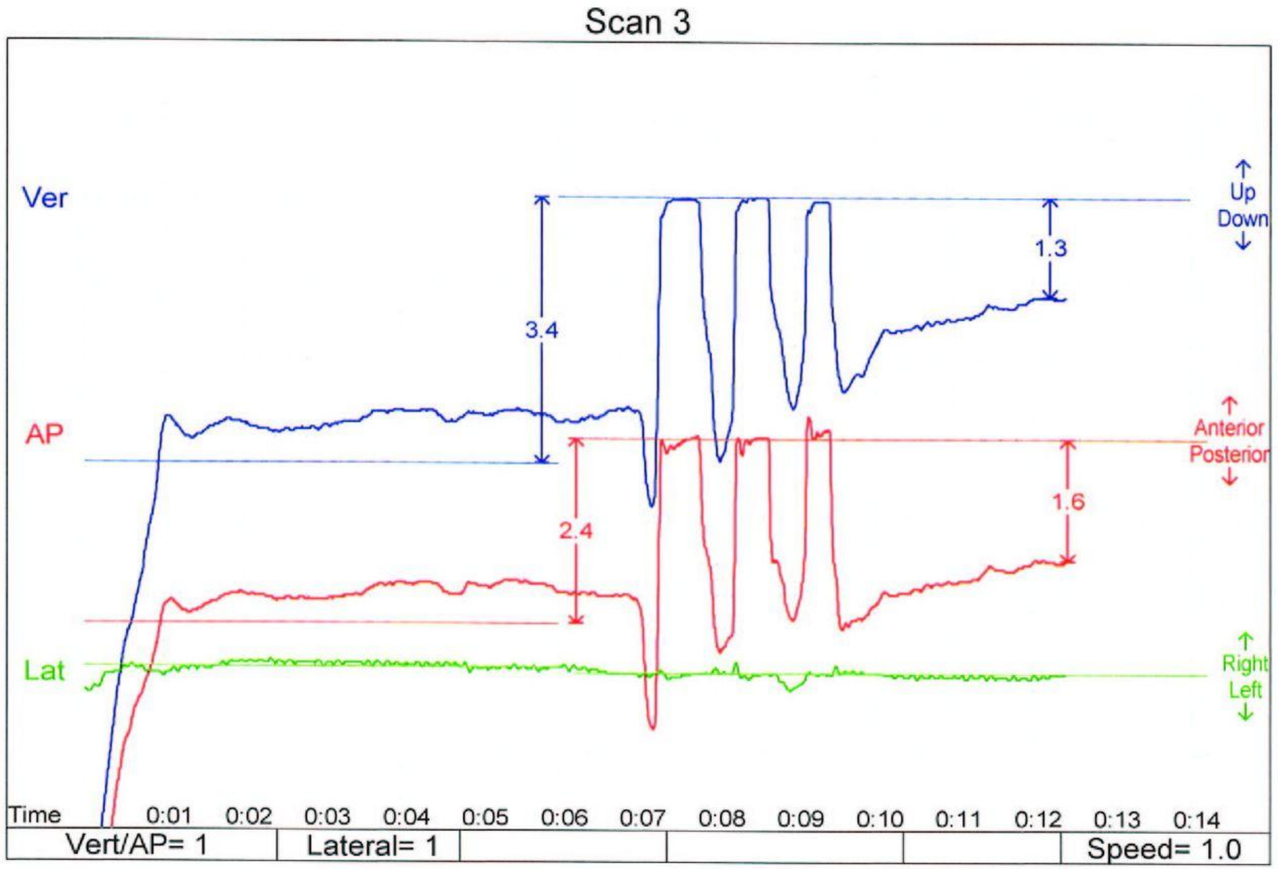
********** Opening 2 **********

Opening
- Maximum Velocity = 133.8 mm/sec
- Average Velocity = 19.8 mm/sec

Closing
- Maximum Velocity = 183.8 mm/sec
- Average Velocity = 122.9 mm/sec

Maximum Velocity of Terminal Tooth Contact= 53 mm/sec

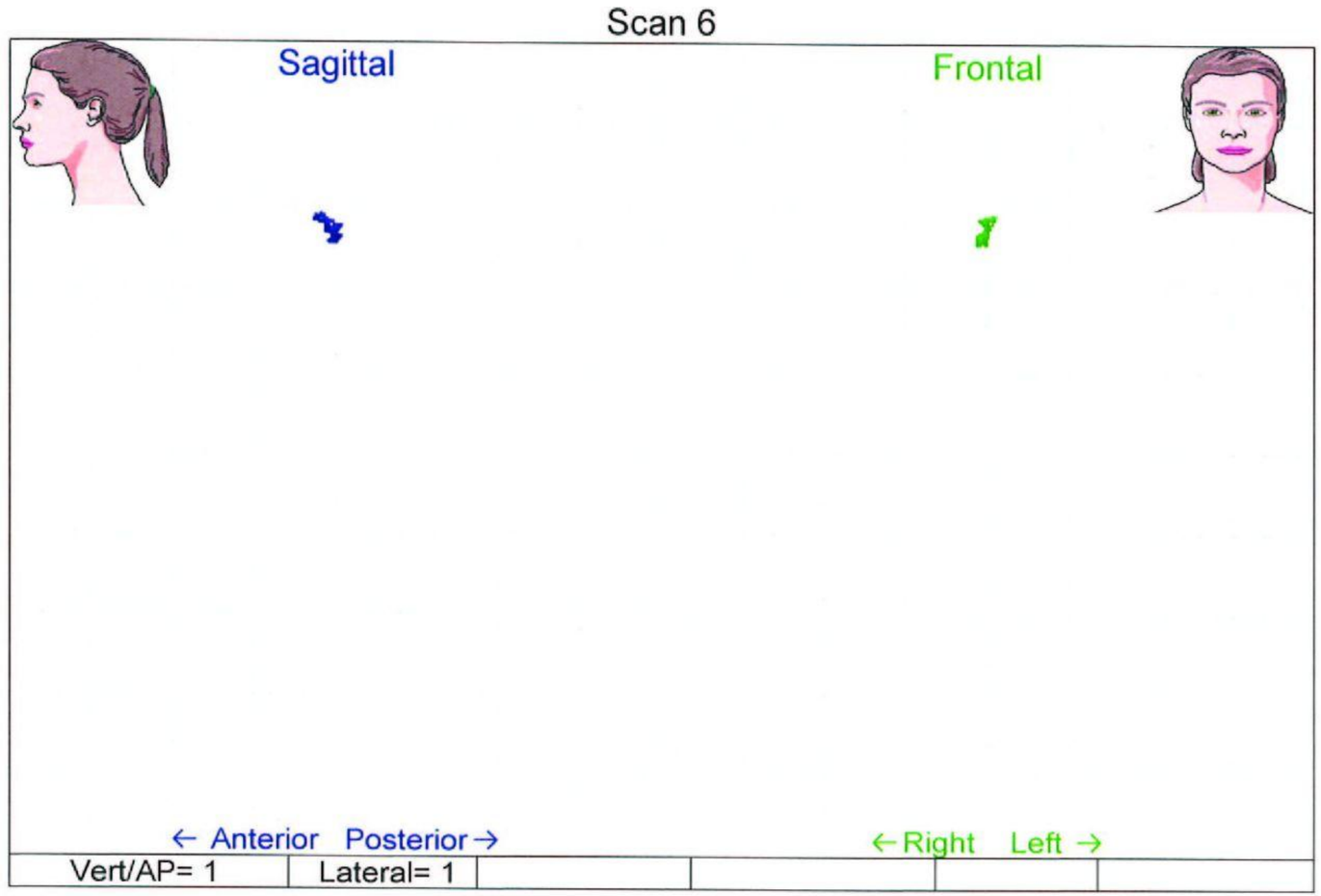
Azia Case



Vertical Freeway Space	= 3.4 mm	Rest Variance= 6.1 mm
Anterior/Posterior Movement	= 2.4 mm Anterior	Rest Variance= 4.5 mm
Lateral Movement	= 0.1 mm Left	Rest Variance= 0.3 mm

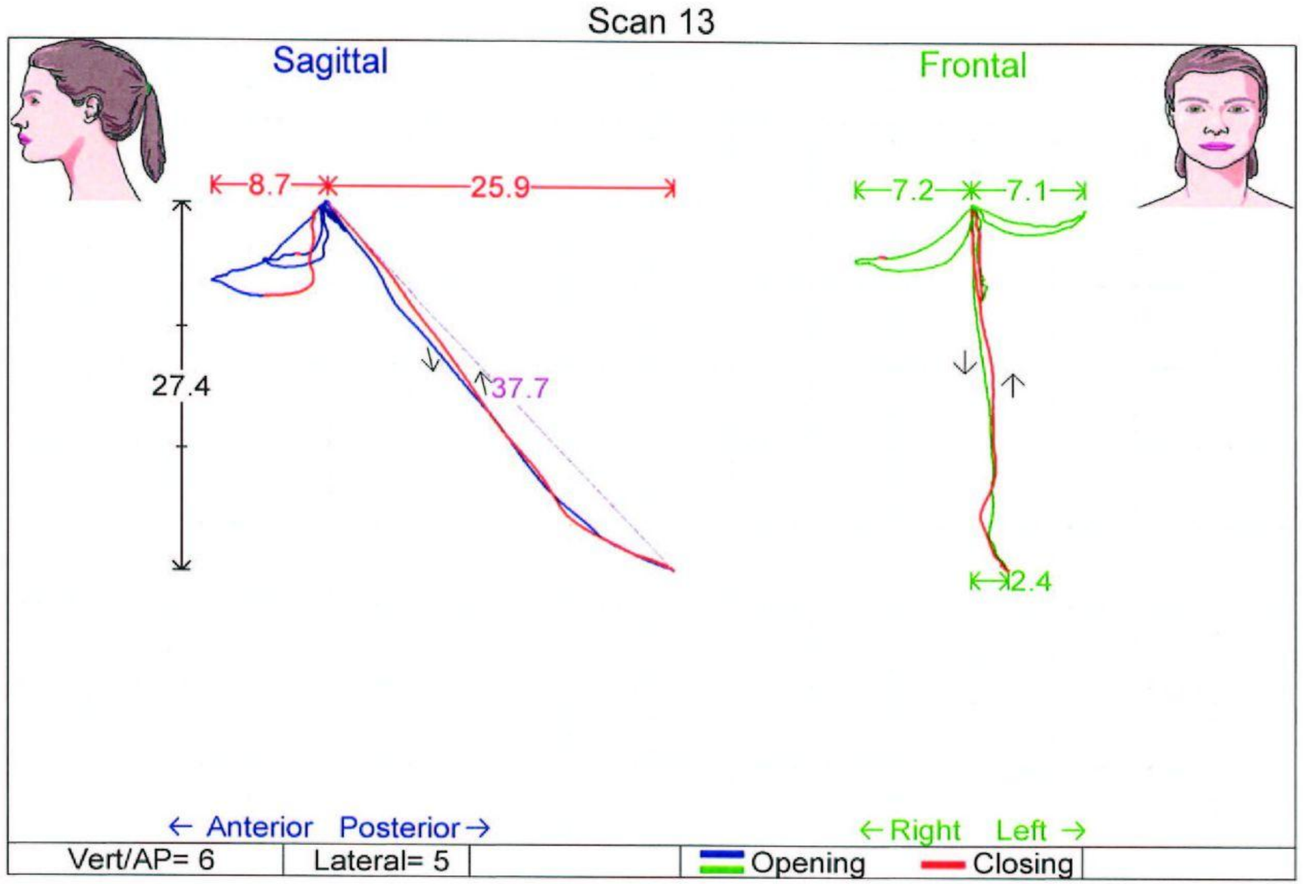
A/V ratio = 0.7

Azia Case



Patient Swallowed with Teeth Together

Azia Case



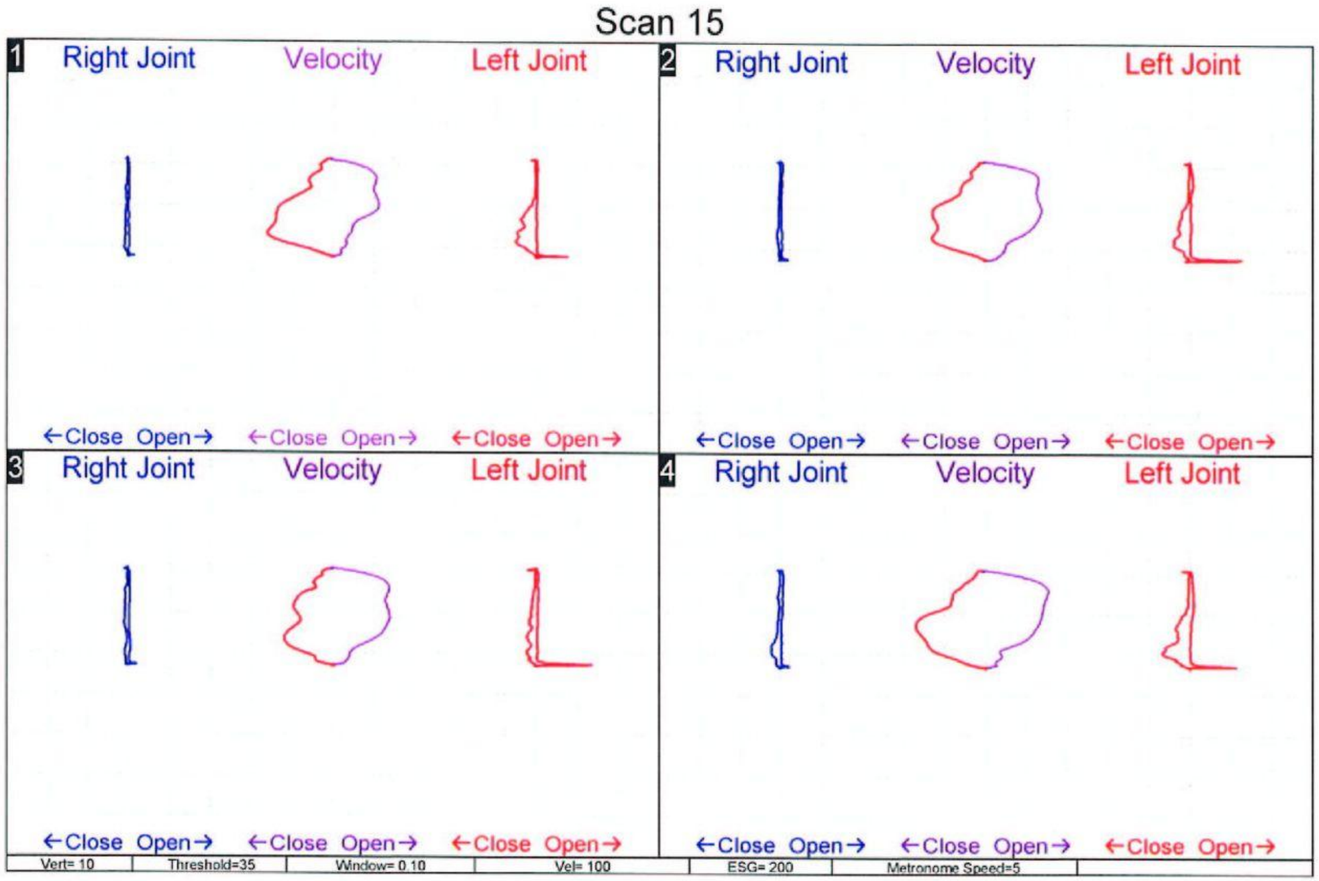
Maximum Vertical Opening = 27.4 mm

Maximum Anterior Movement = 8.7 mm
Maximum Posterior Movement = 25.9 mm

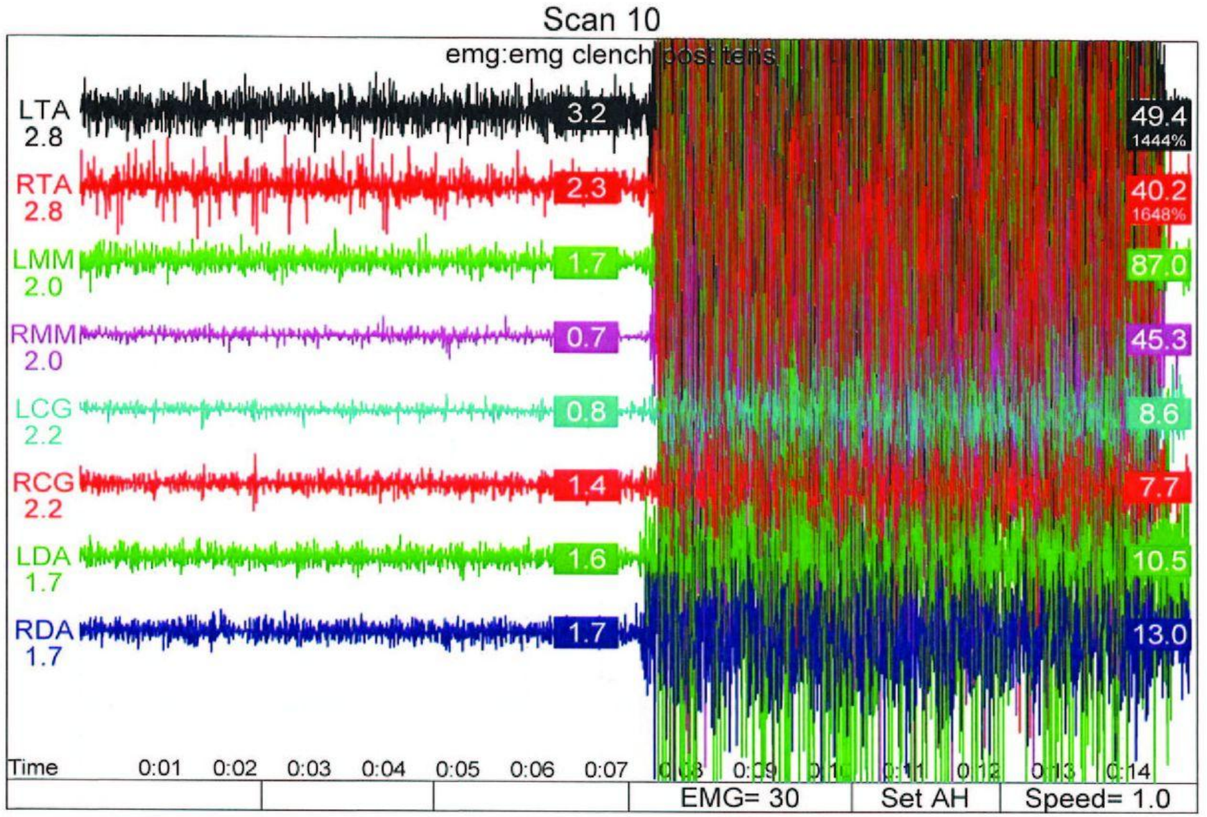
Maximum Lateral Movement Right = 7.2 mm
Maximum Lateral Movement Left = 7.1 mm

C.O. to Maximum Opening = 37.7 mm

Azia Case


Scan 15
1
Right Joint
Velocity
Left Joint
←Close Open→
←Close Open→
←Close Open→
2
Right Joint
Velocity
Left Joint
←Close Open→
←Close Open→
←Close Open→
3
Right Joint
Velocity
Left Joint
←Close Open→
←Close Open→
←Close Open→
4
Right Joint
Velocity
Left Joint
←Close Open→
←Close Open→
←Close Open→
Vert= 10
Threshold=35
Window= 0.10
Vel= 100
ESG= 200
Metronome Speed=5

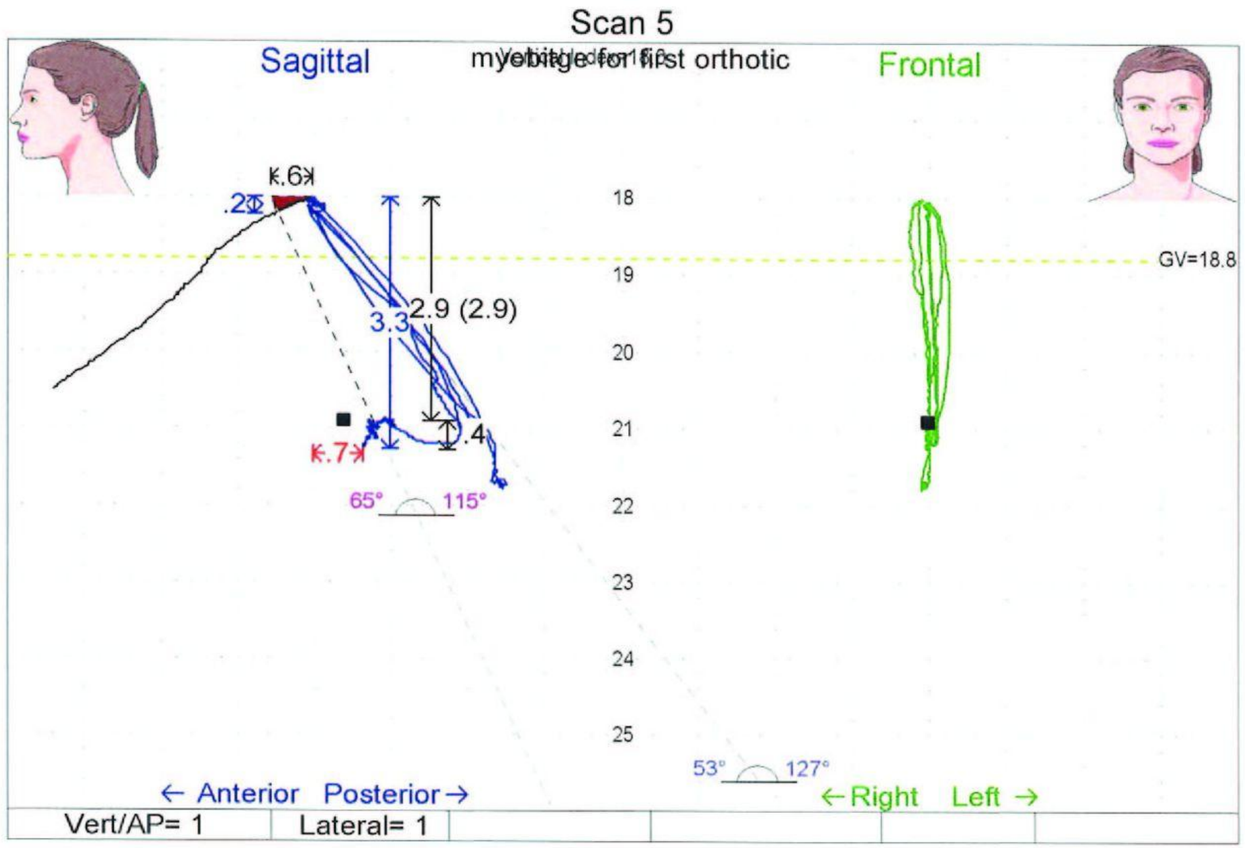
Azia Case



SAMPLE - 14.91 seconds

LTA (Left Temporalis Anterior)	Avg= 3.2 uV	CO Avg= 49.4 uV
RTA (Right Temporalis Anterior)	Avg= 2.3 uV	CO Avg= 40.2 uV
LMM (Left Masseter)	Avg= 1.7 uV	CO Avg= 87.0 uV
RMM (Right Masseter)	Avg= 0.7 uV	CO Avg= 45.3 uV
LCG (Left Cervical Group)	Avg= 0.8 uV	CO Avg= 8.6 uV
RCG (Right Cervical Group)	Avg= 1.4 uV	CO Avg= 7.7 uV
LDA (Left Digastric)	Avg= 1.6 uV	CO Avg= 10.5 uV
RDA (Right Digastric)	Avg= 1.7 uV	CO Avg= 13.0 uV

Azia Case



Physiologic Rest is:
- 3.3 mm Inferior to C.O. (Vertical Freeway Space)
- 0.7 mm Posterior to C.O.
- 0.1 mm Left of C.O.

The Myo-trajectory Intersects the Protrusive Border
- 0.2 mm Inferior to C.O.
- 0.5 mm Anterior to C.O.

From Myo-Trajectory to Habitual CO on Horizontal Plane = 0.6 mm
From Initial Tooth Contact to Horizontal Plane of Habitual C.O. as Measured Along the Myo-Trajectory is = 0.2 mm
0.06 Square mm would have to be Ground on the Sagittal Plane to Accommodate Closure to C.O.

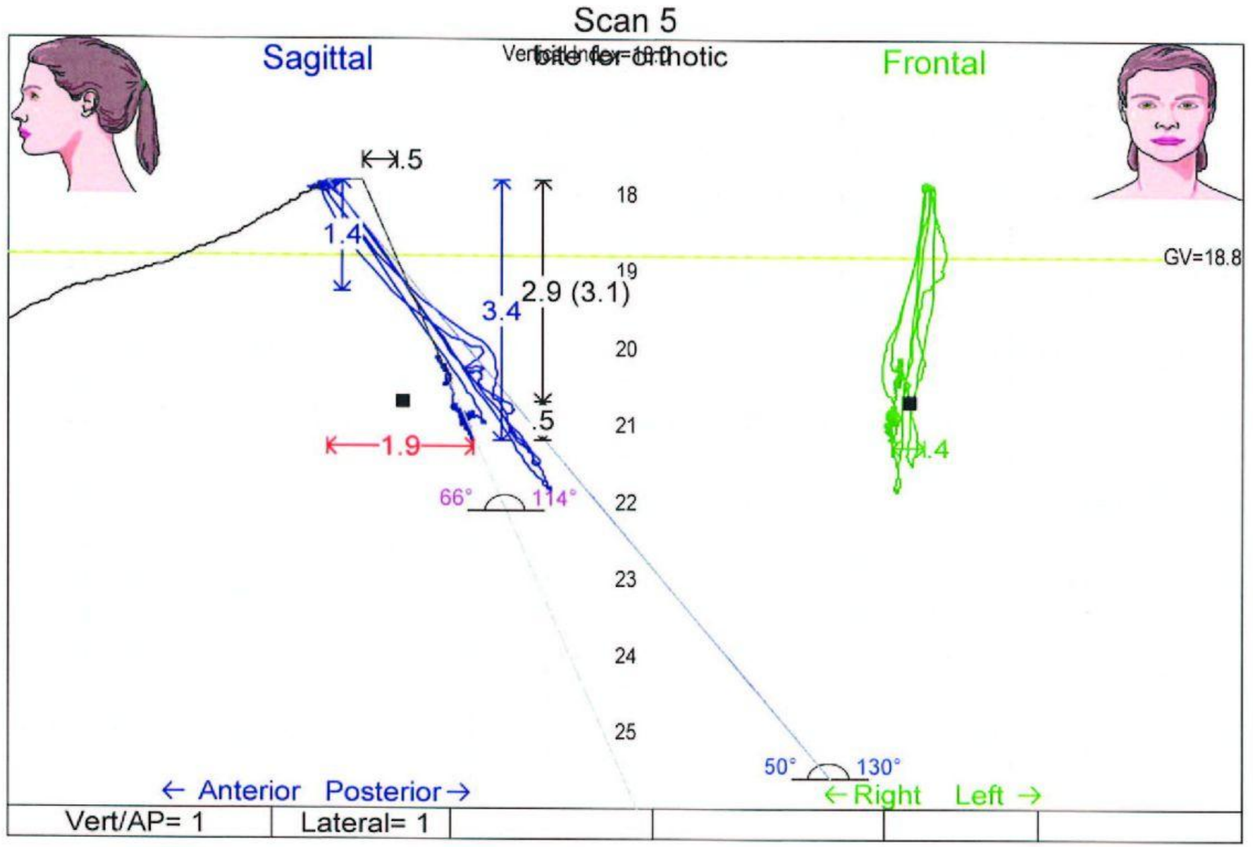
Azia Case

11/7/22

Azia Case

12/27/22

Azia Case



Physiologic Rest is:
- 3.4 mm Inferior to C.O. (Vertical Freeway Space)
- 1.9 mm Posterior to C.O.
- 0.4 mm Right of C.O.

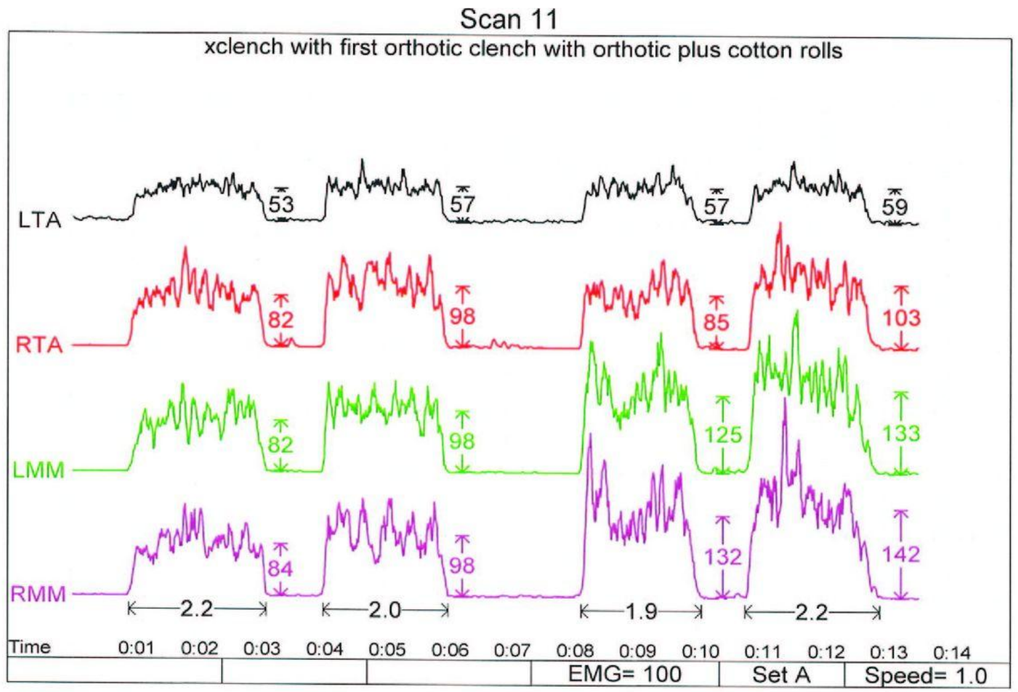
The Myo-trajectory Intersects the Protrusive Border
- 1.4 mm Inferior to C.O.
- 1.1 mm Posterior to C.O.

From Myo-Trajectory to Habitual CO on Horizontal Plane = 0.5 mm

From Initial Tooth Contact to Horizontal Plane of Habitual C.O. as Measured Along the Myo-Trajectory is = 2.1 mm

0.32 Square mm would have to be Ground on the Sagittal Plane to Accommodate Closure to C.O.

Azia Case



Clench 1 over 2.2 Seconds

LTA	(Left Temporalis Anterior)	Peak= 80 uV,	Average= 52.6 uV
RTA	(Right Temporalis Anterior)	Peak= 162 uV,	Average= 82.0 uV
LMM	(Left Masseter)	Peak= 141 uV,	Average= 81.8 uV
RMM	(Right Masseter)	Peak= 144 uV,	Average= 84.2 uV

Firing Order - RTA LMM RMM LTA

Clench 2 over 2.0 Seconds

LTA	(Left Temporalis Anterior)	Peak= 96 uV,	Average= 57.3 uV
RTA	(Right Temporalis Anterior)	Peak= 150 uV,	Average= 98.3 uV
LMM	(Left Masseter)	Peak= 146 uV,	Average= 98.2 uV
RMM	(Right Masseter)	Peak= 164 uV,	Average= 98.1 uV

Firing Order - RMM LMM RTA LTA

Clench 3 over 1.9 Seconds

LTA	(Left Temporalis Anterior)	Peak= 89 uV,	Average= 56.8 uV
RTA	(Right Temporalis Anterior)	Peak= 149 uV,	Average= 85.1 uV
LMM	(Left Masseter)	Peak= 230 uV,	Average= 125.1 uV
RMM	(Right Masseter)	Peak= 249 uV,	Average= 131.6 uV

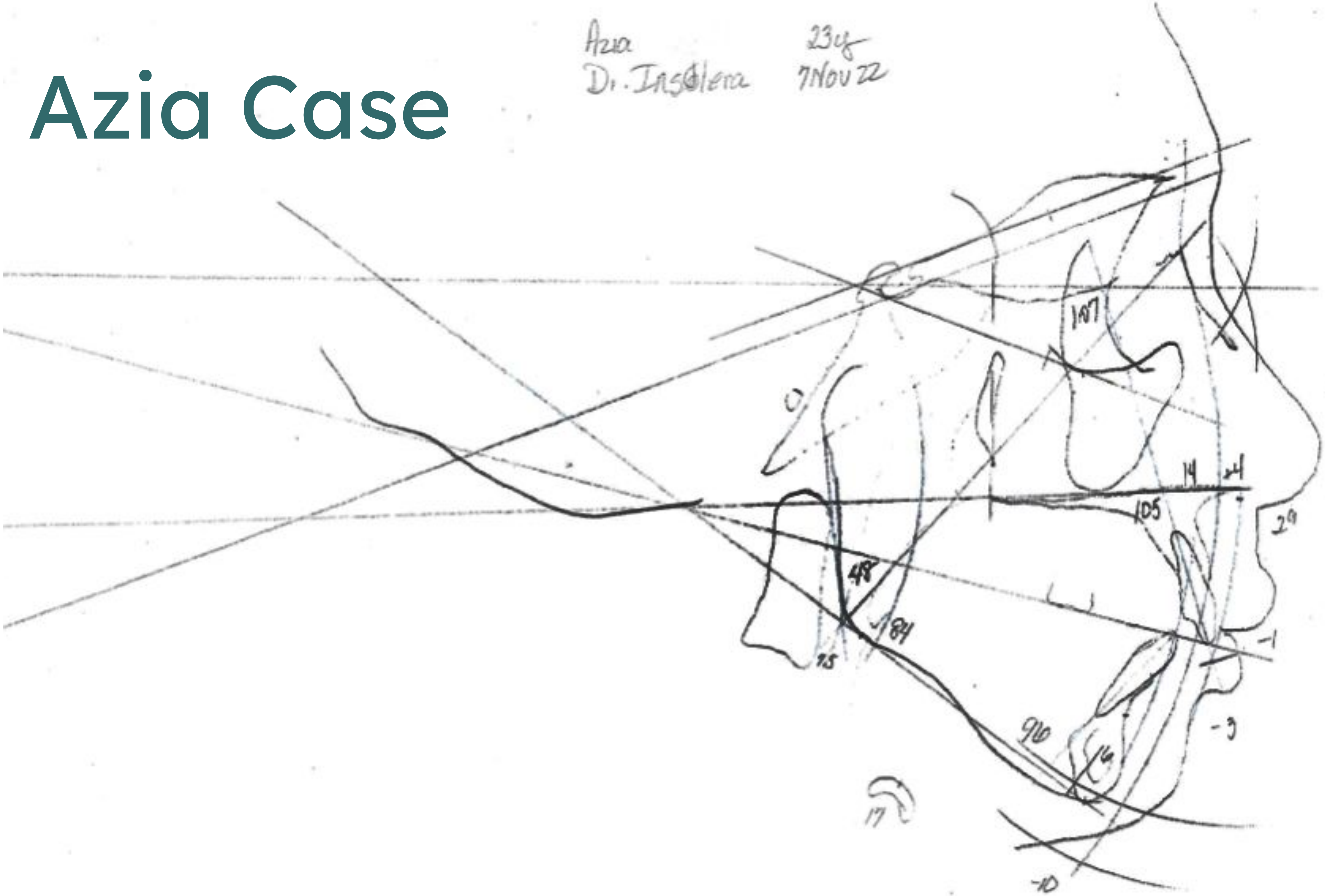
Firing Order - LMM RMM RTA LTA

Clench 4 over 2.2 Seconds

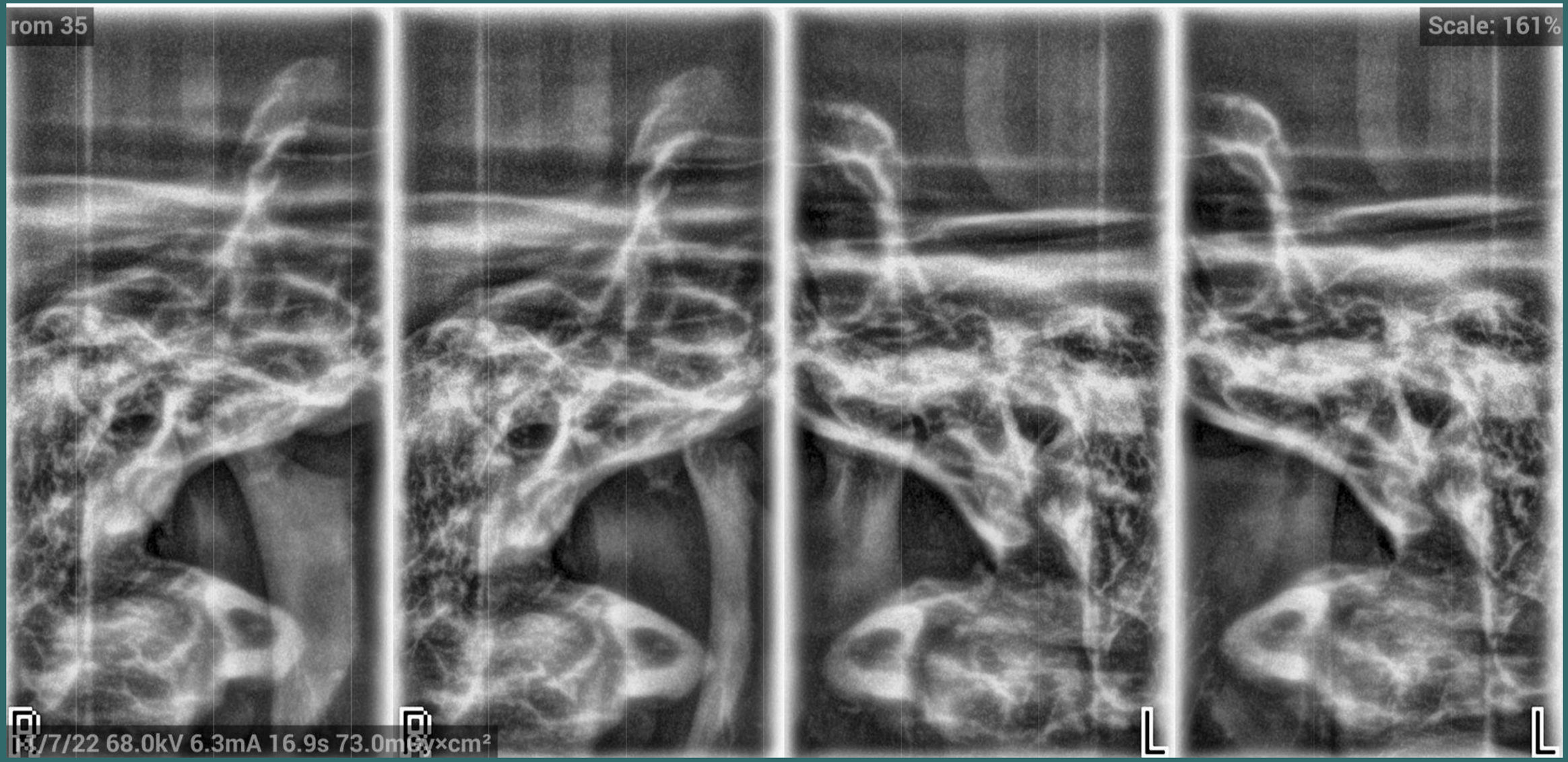
LTA	(Left Temporalis Anterior)	Peak= 99 uV,	Average= 58.5 uV
RTA	(Right Temporalis Anterior)	Peak= 198 uV,	Average= 102.7 uV
LMM	(Left Masseter)	Peak= 273 uV,	Average= 132.8 uV
RMM	(Right Masseter)	Peak= 314 uV,	Average= 142.3 uV

Firing Order - LMM RMM RTA LTA

Azia Case

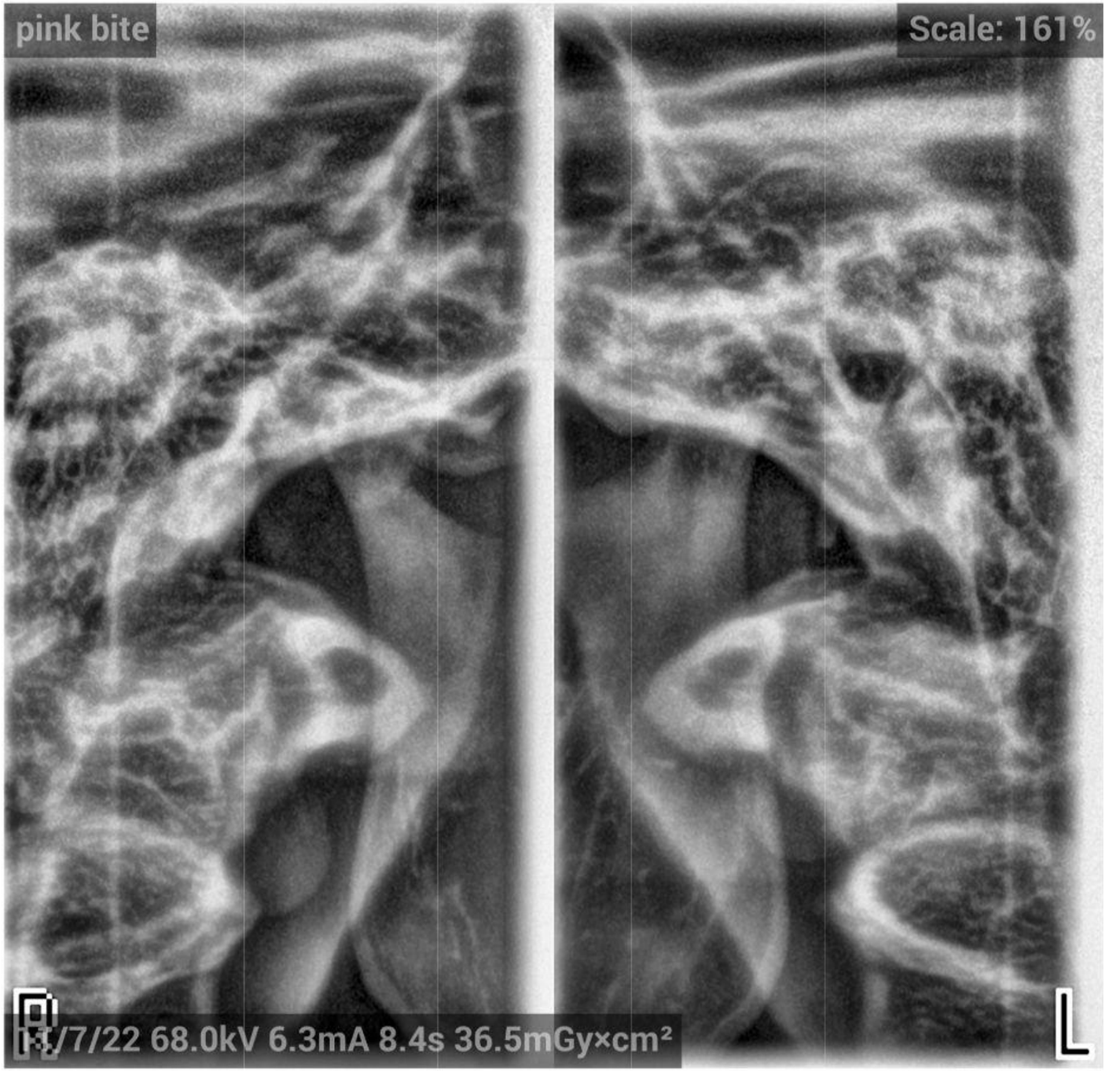


Azia Case



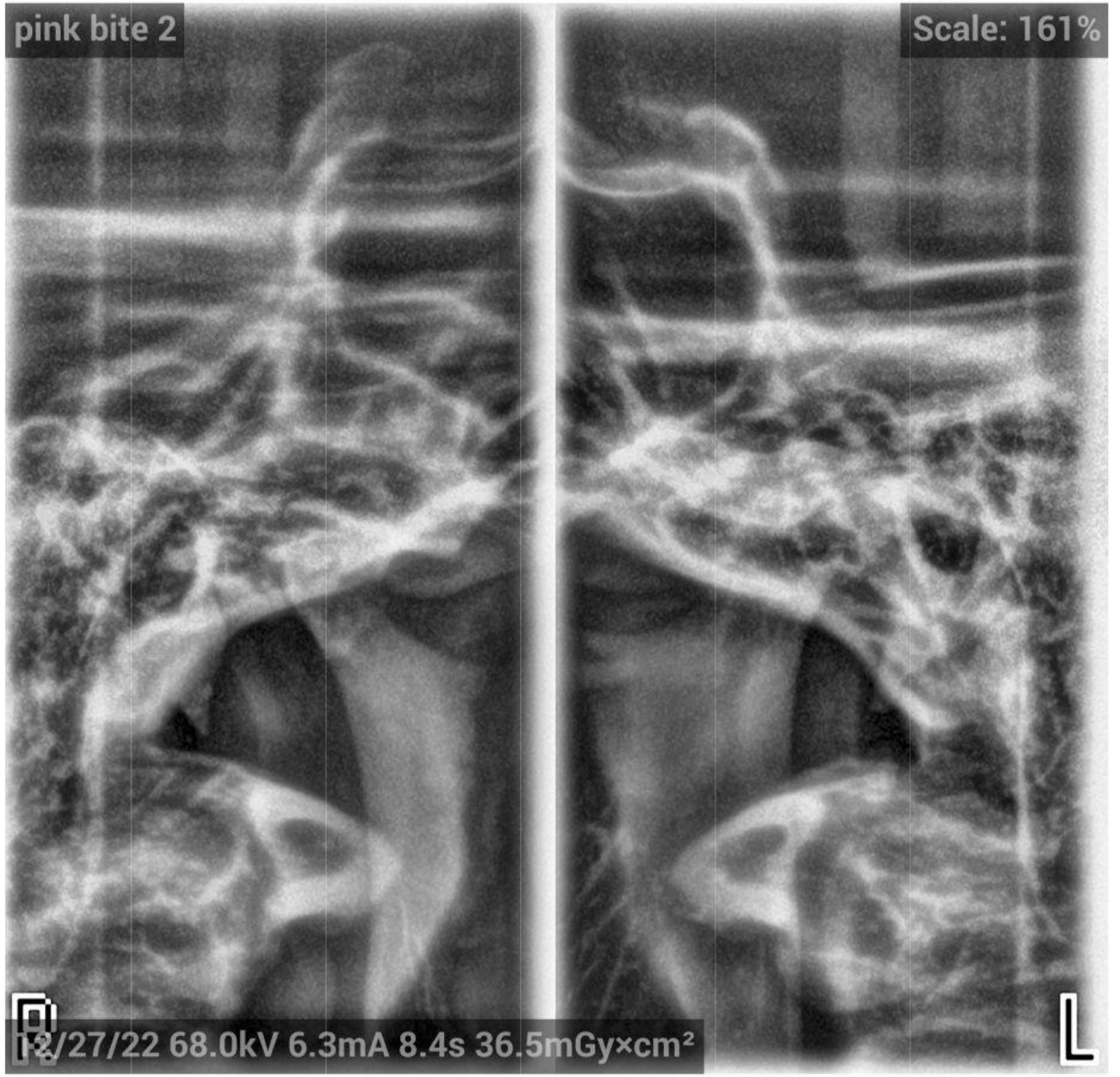
Azia Case

First Orthotic Bite



Azia Case

Second Orthotic Bite



Azia Case