AIRWAY MANAGEMENT:

"Implementing Interdisciplinary Concepts Associated with Forward Locomotor Movement"

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AAPMD Webinar

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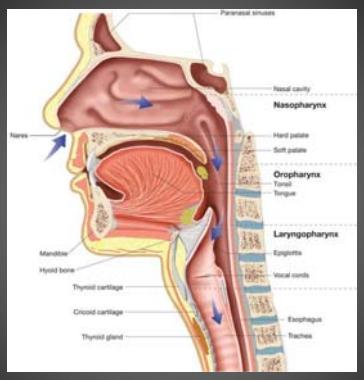
How is the airway related to forward movement of our body during walking?

First; our airways, the oropharyngeal, laryngeal, trachea, and bronchi are placed in front of our neck and thoracic spine.

This is important to recognize, because we really are pushing our airways and lungs forward when we move our bodies forward.



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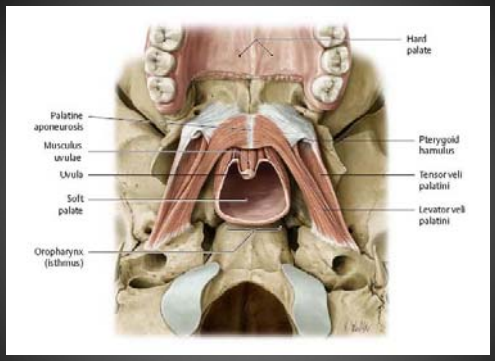

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https://doctorlib.info/medical/anatomy/38.html

Any forward movement of the body that is directional in natural movement, i.e. left or right, will create a counter directional movement that is primarily developed by neuro-processing of input received by the visual, pulmonary, and vestibular-ground based systems.

Second; when the human body loses its oscillatory ability to shift from side to side, or its ability to compress (lower) on one side as the other side decompresses (raise), or its normal timing of upper extremity forward reach with lower extremity ground push, it relies heavily on autonomic processing to stay safe.

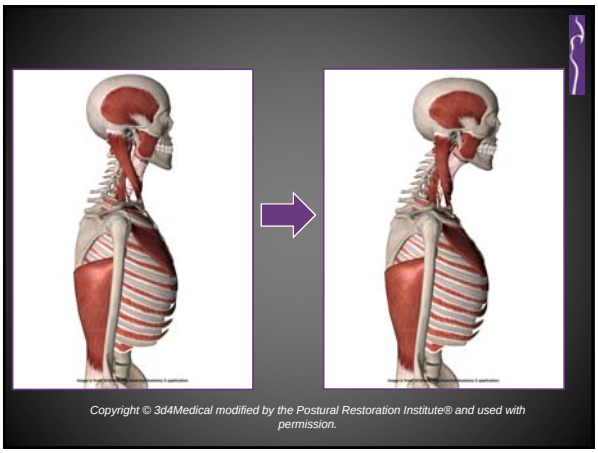
The first autonomic anatomical region that will reflect this sympathetic overactivity is the head and neck.

Most of us forget that when the head does not "ride" a body that is moving forward because of push from the arms and legs, the body will need to shift to one side so the head and neck can lead, pull and support the laterally positioned body for ventilation, that is now dependent on ventilation from a head that is forward, laterally displaced and rotated to the non-dominant side of the head and neck.

It would be safe to say that our heads and necks go forward, lateral and rotate when adequate “push” from both legs and arms is lost, when the increase in asymmetry of the shape of the lung limits both alveolar ventilation and perfusion, and when the atlas in no longer sitting directly under the head or its occiput in a neutral state when upright.

Third; as or after the first two points are occurring or have occurred, human airway resistance increases because of torsional related challenged airflow, positional limiting airway diameter compression, and vagal/sympathetic vessel wall constriction.

The neck and head, in attempting to resolve this airway and airflow resistance, is moved forward by the accessory breathing muscles on the outside of the body.



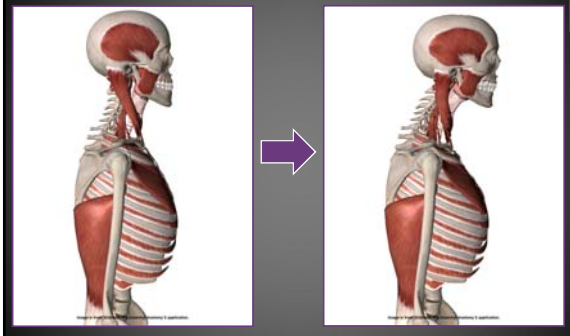
There are numerous studies that been done on both humans and horses that have looked at the effect of body posture on pharyngeal shape, and size.

And similar studies have been done on adults without obstructive sleep apnea.

They have looked at the influence of head and neck position on the performance of supraglottic airway devices in humans, and have looked at positional changes of anatomical structures surrounding the upper airway and how these anatomical changes affect the pharyngeal mechanics and collapsibility in both humans and horses.

As the head and neck move forward, the accompanying upper chest walls and underlying lungs move back to assist in moving air into the upper anterior lungs as the head, in its forward position, assists in pulling the top ribs up, to increase the ease of airflow pulled into the lungs by the diaphragms.

Now the upper spine behind the upper chest wall is pulling, not pushing, the chest wall forward during forward body movement and during walking. Directional movement of the body is now primarily done by the head and neck, not by the lower back, pelvis and hips, at the consequence of paradoxical breathing mechanics.



Operationally, the patterned head and neck compensation associated with forward head posture or forward head driven body movement is defined by the way our brain negotiates, regulates and mediates forward movement that is now associated with patterned restricted airflow, pressure regulation and exchange.

This processing of information to sustain life when ongoing lateralized forward movement becomes obligatory to breathe, I refer to as functional cortical dominant respiration.

Airway Management Using Interdisciplinary Oscillatory Concepts During Forward Locomotor Movement

What Does Functional Cortical Dominance Mean?

Functional cortical dominance refers to the eye, the ear, the tongue, the nose, the hand, and the foot that the brain predominantly uses for cortical, habitual, patterning of upright centering.

If centering of body mass is over the right foot and ankle when in standing, and not in the center of the human body, i.e. over the midline point between the two feet, the body is following left to right asymmetry that happened in the early stages of vertebrate embryonic development.

(Hafezi F, et al. Laterality and left-sidedness in the nose, face and body: A new finding. Plast Reconstr Surg Glob Open, 2017 Dec 5(12).)

The body will compensate to safely stay secured over the right foot through functional cortical integration of the references mentioned above, in the first sentence.

To perceive the actual center of our upright body, we need to rely on references that stop us from moving too far to one direction from the other.

Otherwise, our ‘self-preservation’ mindedness and ‘balance’ centers of our brain stem places our bodies in a somewhat predictable state of right ‘lateral-lock’.

A state that limits our ability to alternate from one side to another.

The greatest influence of poor alternation of required physiological push from the ground, during forward locomotor movement (walking), is the high incidence of airway ventilatory obstruction, decreased forced vital capacity, decreased forced expiratory volume, increased residual volume, and increase in total airway resistance.

Why Do Heads Lead Bodies?

Human heads advance body movement forward when the interplay and integration of sensorium provided by the two feet, the two eyes, the two nasal vestibules, the two sides of the tongue, the two ears, the two hands, and the two rows of upper and lower teeth are lost.

Who Can Reduce Patterned Head Compensation?

Sensorial interplay of system integration can be achieved by interdisciplinary clinicians who respect the need to not over-treat or under-treat individuals with patterned head compensation objectivity.

How Do Interdisciplinary Clinicians Reduce Patterned Head Compensation?

The underlying element of all this interdisciplinary respect is the head and neck's orientation to each other.

Each discipline, that is a member of the patient's healthcare team, owns the responsibility for achieving and maintaining a cervical and respiratory neutral position, for appropriate oscillation or alternation of both the head on the body, or the body on the head, during forward locomotor movement or ambulation.

This position is also required for all the working clinicians to go to, as they equilibrate and modify their effort, safely, without negatively interfering with other neuro-biologic systems that are simultaneously being treated or modified by other "neutral" minded clinicians.

When Does the Head and Neck Begin to Integrate with the Lower Extremities and Feet?

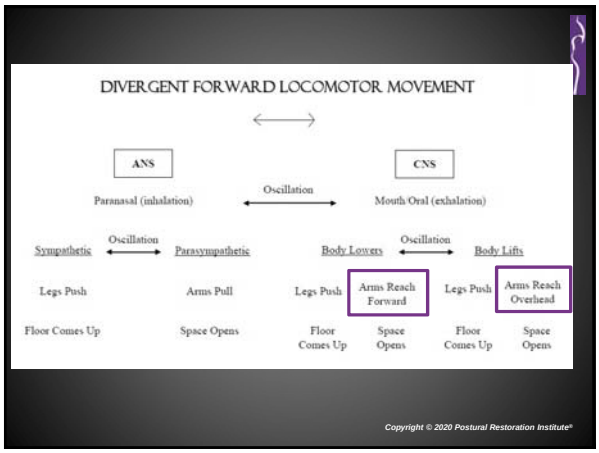
After 7 years of age, a person should be able to independently turn their head on their body without the body moving first, or without the body moving at all.

Head on body (HOB) reflexes should have been integrated at 7 years of age.

Unaligned teeth (malocclusion and crossbites) that "interlock" co-exist on head and neck anatomy that is advanced forward.

Narrow bases of gait, poor binocular fusion, and crossover of feet, toes, fingers, etc. are all indicators of limited airway management because of forward head and neck placement.

Divergent Versus Convergent Forward Locomotor Movement


DIVERGENT FORWARD LOCOMOTOR MOVEMENT
ANS
CNS
Paranasal (inhalation)
Oscillation
Mouth/Oral (exhalation)
Sympathetic
Oscillation
Parasympathetic
Body Lowers
Oscillation
Body Lifts
Legs Push
Arms Pull
Legs Push
Arms Reach Forward
Legs Push
Arms Reach Overhead
Floor Comes Up
Space Opens
Floor Comes Up
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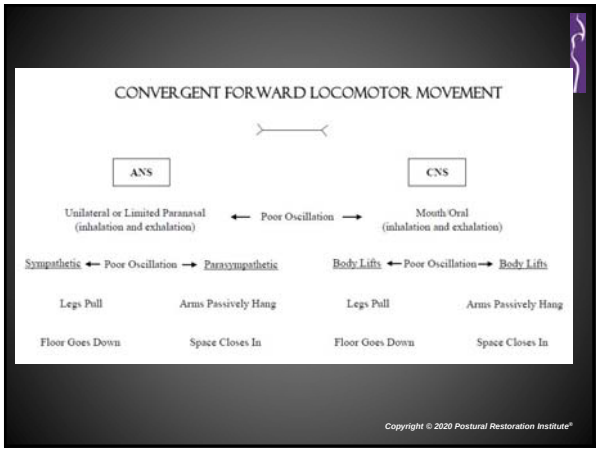
CONVERGENT FORWARD LOCOMOTOR MOVEMENT
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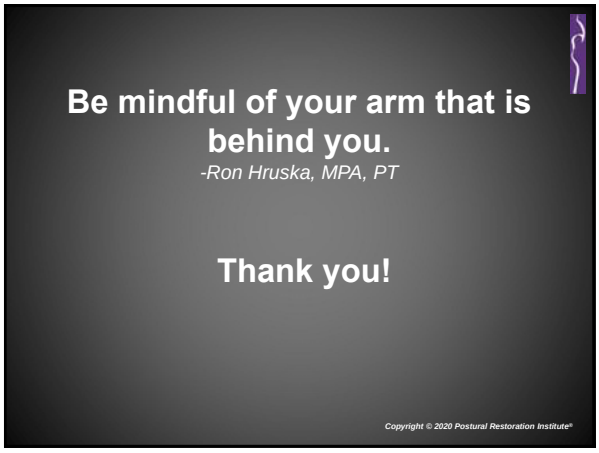
Be mindful of your arm that is behind you.
-Ron Hruska, MPA, PT
Thank you!
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