Functional Neurological Aspects to Movement As it Relates to Posture and Cognition

By:

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Falls

- The number one leading cause of death in all age groups is FALLS
- Except in Teenagers and individuals in early 20's. Their leading cause of death is automotive accidents

Why do we fall

- Individuals may fall for a variety of reasons
  - Accidents
  - Degenerative Conditions
    - Osteoarthritis
    - Arthritis
  - Neurological
    - Sensory Motor Deficits
    - Visual Perceptual/Vestibular
    - Toxic exposure (ie: alcohol, drugs,...)

Lets look at standing

- In order for bipedal creatures to stand we have to be able to maintain an accurate center of pressure for our center of mass to rest upon.

- Center of Pressure: COP refers to the point at which the pressure of the body over the soles of the feet would be if it were concentrated on one spot.

Let look at Standing Cont.

- The COP is a dynamic action: It is constantly changing trying to be one step ahead of where it needs to be in order to provide a stable base for our bodies to rest upon and remain stable.
- For example, if a person wishes to stand they need to move their center of mass many times as they shift from sitting into an erect posture. Both center of mass and center of pressure shift continuously in order for this process to occur.

Lets look at standing cont.

- As our center of mass and center of pressure shift, our nervous system makes thousands of calculations and corrections to our bodies so that we typically stay aware of where we are in space and time.
- If all systems are functioning as intended an individual is able to smoothly move through space and time and go from sitting to standing.

When Our Bodies Don't Behave

- Being able to be aware of our bodies position in time and space is key to being able to move freely and pain free.
- This requires a complex network of nervous system tracks and neurons working together
- It also requires healthy muscle and blood supply to deliver food and oxygen to the system.

Our Senses

- 5 Common Senses
  - Touch
  - Sight
  - Smell
  - Taste
  - Hearing
- Special Senses
  - Vestibular
  - Proprioception

Proprioception

The proprioceptive sense is believed to be composed of information from sensory neurons located in the inner ear (motion and orientation) and in the stretch receptors located in the muscles and the joint-supporting ligaments (stance). There are specific nerve receptors for this form of perception termed "proprioreceptors," just as there are specific receptors for pressure, light, temperature, sound, and other sensory experiences.

Muscle

- Muscle is not only important in proprioception but it plays a key role in inhibiting pain.
- The nerve fiber that innervates the muscle spindle (1a) plays a key role in controlling pain.
- Therefore, the more muscle mass you have and the better condition you have:
  - Better awareness in space and time
  - Appreciate pain less.

Putting picture together

- Without the correct center of pressure one will have a greater likelihood of not moving through space correctly.
- Posture will become distorted as the nervous tracks responsible to maintain a healthy system are fed incorrect information.
- The reverse is also true. Poor muscle spindle activation will lead to postural faults causing an abnormal center of pressure to occur.

How to address issues

- Various philosophies exist on how to handle a breakdown in systems resulting in increased fall risk.
- Movement based activities tend to be the most favored approach.
- They more effectively address:
  - Balance
  - Body Awareness
  - Strength
  - Conditioning

The Back Muscles Are Key

- The back muscles are very important in not only allowing you to move correctly but also to maintain your cognitive abilities.
- The cerebellum plays a key role in stimulating areas of your brain associated with cognitive skills.
- Poor or altered input into the cerebellum will lead also to cognitive decline.

Where Do You See This

- Conditions such as:
  - Parkinson's
  - Multiple Sclerosis
  - Alzheimer's
  - Osteoarthritis
- Can cause a breakdown in key neurological tracks which provide input back to the cerebellum. The misinformation places increased stress on the system resulting in metabolic fatigue and breakdown.
- Over time this results in cognitive decline as well

How

- When the nervous system fails to provide information correctly the body losses positional awareness. Groups of muscles that should always be firing lengthen and fire less. Other groups shorten and fire more. This leads to postural alterations such as:
  - Rounded Shoulders
  - Forward Head Carriage
  - Anterior pelvis

Primitive Reflexes

- If there is significant enough breakdown in the neuro-integration of the body, Primitive Reflexes such as the Moro and Asymmetric Tonic Neck Reflexes can start to reappear.
- When these start to reappear it will always be associated with cognitive decline and postural instability.
- Lack of awareness to one's environment from a postural and cognitive perspective leads to FALLS!!

Proper Neuro Stimulation

- There are many excellent forms of postural and cognitive stimulation available:
  - Yoga
  - Pilates
  - Ti Chi
  - Walking

Functional Neurological Therapy

- Should postural or cognitive failures progress or not respond to typical therapies or exercise programs FNT may be beneficial.
- FNT evaluates the nervous system to determine what non invasive approaches can best address an individuals nervous system.
- It does not replace an exercise program or therapy, rather it looks at ways of improving ones neurological potential.

Dynamic Approach

- Utilizing sequenced events such as eye movement, head position, sound, light, smell, and or frequency to appropriately stimulate the nervous system to produce a positive response.
- IE: Parkinson's patient: Use exaggerated movements along with a metronome in order to improve posture, gate, and ease of movement.
- Use sheet music to stimulate temporal region of the brain to improve cognition.

Dynamic Approach Cont.

- Use low speed spinning to address cerebellum's role in autonomic control of blood supply.
- Utilize low intensity short term repetitive exercises to increase neural plasticity and metabolic fatigue.
- Use primitive reflex remediation exercise to suppress reemergence.

Practical Exercise Program

- Remember, participation is voluntary. You should not participate if you have any questions or concerns about your ability to safely perform exercises.
- This is for demonstration only. It does not constitute care or the establishment of doctor patient relationship.
- Thank you!!

Questions

For more information or to watch videos

www.naturallywell.us

For more information of chiropractic neurology

www.acnb.org