

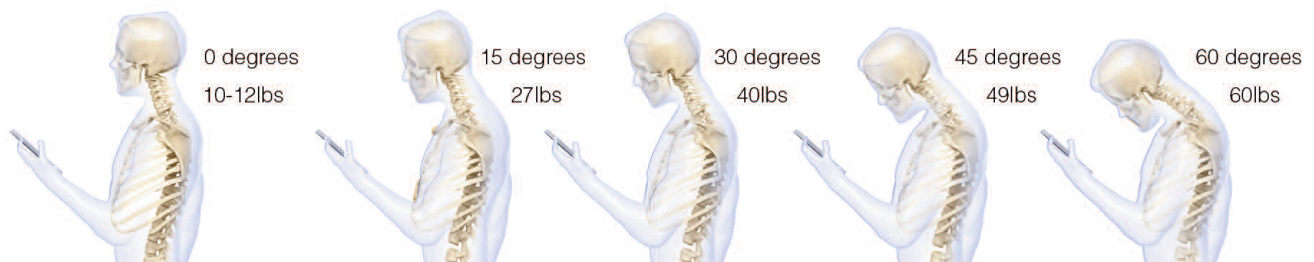
## Assessment of Stresses in the Cervical Spine Caused by Posture and Position of the Head

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### KEY POINTS FROM THIS ARTICLE:

- 1) Billions of people are using cell phone devices on the planet, essentially in poor posture.
- 2) The purpose of this study is to assess the forces incrementally seen by the cervical spine as the head is tilted forward, into worsening posture. This data is also necessary for cervical spine surgeons to understand in the reconstruction of the neck.
- 3) Dr. Hansraj created a cervical spine model to calculate the forces experienced by the cervical spine when in incremental flexion (forward head position). His mathematical analysis used a head weight of 13.2 pounds.
- 4) "The weight seen by the spine dramatically increases when flexing the head forward at varying degrees.":

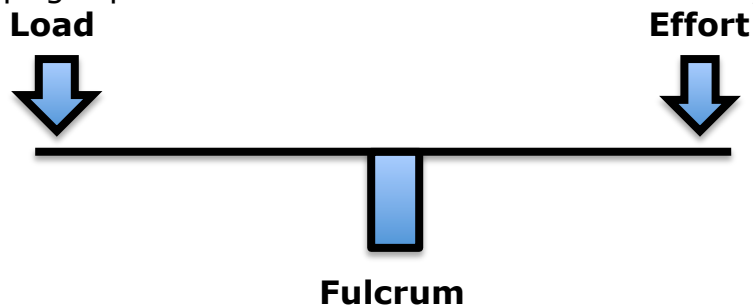


- 5) "Loss of the natural curve of the cervical spine leads to incrementally increased stresses about the cervical spine. These stresses may lead to early wear, tear, degeneration, and possibly surgeries." **[Key Point]**
- 6) Dr. Hansraj claims that there are no other studies assessing the stresses about the neck when incrementally moving the head forward.
- 7) Good posture is defined as ears aligned with the shoulders and the scapula, retracted. "In proper alignment, spinal stress is diminished."

- 8) Good posture is associated with "elevations in testosterone, increases in serotonin, decreases in cortisol, and increased feelings of power and tolerance for risk taking."
- 9) Poor posture is associated with reductions in testosterone levels, reduced serotonin, increased cortisol and reduced feelings of power.
- 10) "Poor posture invariably occurs with the head in a tilted forward position and the shoulders drooping forward in a rounded position."
- 11) An average person spends 2-4 hours a day with their heads tilted forward reading and texting on their smart phones / devices, amassing 700-1400 hours of excess, abnormal cervical spine stress per year. "A high school student may spend an extra 5,000 hours in poor posture" per year.
- 12) Cervical spine surgeons need to pay attention to the alignment and to the stresses about the spine when performing anterior discectomies and fusion. Post-surgical "final position of the neck becomes critical."
- 13) "Misalignment of a reconstructed segment into kyphosis will lead to a biomechanical disadvantage and more than likely will affect breakdown of the adjacent segment." **[Important]**

#### COMMENTS FROM DAN MURPHY

Remember, upright posture is a 1<sup>st</sup> class mechanical lever system:



The loads on the fulcrum (disc and facet joints) would be double those calculated in this study as a consequence of the counterbalancing contraction of the muscles:

