

Morning Stiffness

Does morning stiffness refer to actual stiffness/tightness or pain or a combination of the two? Clearly patients are complaining of difficulty in movement. Some patients take a warm shower and stretch and are symptom free to the next morning; for others the stiffness and pain persists for hours and then recedes with increased movement, only to return later in the evening.

As Gifford¹ states, morning stiffness is linked to "changes in range of movement, fluid accumulation, weakness and perceptual and reflexogenic factors associated with nociceptive and central pain mechanisms." An inflammatory arthropathy is often blamed for morning stiffness and the decrease in this stiffness is often used as a measure of the effectiveness of treatment.²

In the morning there is normally less lumbar flexion than later in the day.³ This is probably due to fluid accumulation of the disc during the night. First thing in the morning the spine will be more mechanically stiff due to the swollen discs. The avascular disc requires continuous pressure changes for its survival. Not only does gravity affect the fluid interchange but discs are also affected by muscular forces and viscoelastic deformation of the annular fibers. Gossman⁴ showed that immobilization of muscle can result in shortening within a few hours. In the shortened position the amount of sarcomeres decreases. Viscoelastic tissues elongate with load and slowly shorten when the load is decreased or eliminated. Gifford¹ feels that due to the perception of stiffness the central nervous system might increase resting muscle tone and inhibit movement to protect the musculoskeletal tissues after prolonged inactivity.

Morning stiffness may also be related to glycosaminoglycan hyaluronic acid (HA) which is in the extracellular portion of all connective tissues including discs. HA attracts water and also resists water flow.⁵ Connective tissue accumulation of HA causes increased rigidity of tissue and restricts joint and muscle motion. Activity forces HA out of the tissues into the lymphatics and plasma. In the early morning the plasma levels are low, indicating an increase in the interstitial tissue concentrations and resulting in stiffness. Plasma levels of HA double after being up and active for one hour.⁶ Increased output of HA is stimulated during inflammation by the kinin, interleukin-1, and HA levels increase when inflamed tissues are at rest.¹

Bogduk and Twomey⁷ found that disc injury causes increased disc pressure, which can cause pain by stretching the innervated peripheral annulus. This may explain why an acute disc patient is worse in the morning, when changing from the lying to sitting position. Gifford¹ states that these patients will benefit in the morning by doing several minutes of gentle lumbar movements before rising. This movement may expel some fluid (including inflammatory exudate) from the disc, reducing discal pressure. The reduction in discal pressure may also cause the CNS to reduce its inhibitory effect, causing increased muscle tone.

Did you ever notice that a patient may feel good while receiving traction and feel pain when the traction is released or upon getting up from the traction table? This is an example of increasing discal pressure (as during a night's sleep) and the result of immediate motion. Again, immediately after the traction, a pelvic rock and rotational exercise might help. The presence of pain in this scenario may also be an indication of a hydrostatically intact disc since normal fluid dependent behavior occurred.⁸

Gifford¹ gives an interesting history of a patient with chronic morning stiffness for two hours, which freed up during the day with movement. The stiffness continued until the patient developed posterior thigh pain, which continued for 8 to 10 weeks. After the thigh pain left the patient was rid of his morning stiffness. Is it possible that the morning stiffness was due to an inflammatory disc mechanism affecting the fluid exchange as explained above? Could it be that the patient developed a radial fissure in the

annulus resulting in a loss of the fluid mechanism, and therefore the loss of stiffness?

References

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