UNDERSTANDING AND CARING FOR THE POSTERIOR AND ANTERIOR PELVIC TILT

THOMAS R. HETZEL, PT, ATP
RIDE DESIGNS, DENVER, COLORADO

Introduction

The most common tendency for pelvic rotation in the seated posture is the posterior pelvic tilt. Why do people stand most commonly with an anterior pelvic tilt, yet sit with a posterior pelvic tilt? Why, with exception of pathology typically related to the spine or hip, do people rarely stand with a posterior pelvic tilt? Why is it that some people sit with a tendency for anterior pelvic rotation? The answer lies in the difference of hip mechanics in standing versus sitting.

It is extremely important to understand the biomechanics of the hip and spine as they relate to pelvic tendencies, pelvic mobility, and pelvic stability. Even a person who sits with that perfect "neutral" pelvis has a predominant tendency towards posterior or anterior pelvic rotation.
It is well accepted that supporting a person in sitting in a fashion that promotes an upright, balanced and "neutral" pelvis is the key to good spinal alignment, which in turn facilitates optimal head and neck as well as scapular-thoracic alignment. Factors determining a person's ability to sit upright, and interventions to accomplish this lofty goal are less understood.

This presentation will attempt to explain basic causative and corrective factors associated with the anterior and posterior pelvic tendencies. General guidelines for wheelchair seating intervention will be explained relative to a sitter's tendency, cause of the tendency, flexibility, and tolerance for correction. The focus will be on biomechanics of correction and stabilization of the posterior and anterior pelvic tendencies with an emphasis on how angular relationships, shapes, and orientation of seat and back supports impact postural alignment. Certainly a person's risk for skin breakdown will impact seating intervention.

The Hip in Standing

The hip joint has greater stability in standing than it does in sitting. The hip capsule and hip flexors influence this greatly. Because hip extension is the closed pack position for the hip, standing with hip extension winds up the hip joint capsule for greater stability. One can, in fact, stand with the hip at end range of extension, relax the musculature about the hip, and not fall, as the hip capsule reaches end range and blocks further extension. The hip flexors' (iliopsoas) role further adds to the stability of the hip in standing. Originating at the iliac fossa and anterior surfaces of the lumbar vertebral bodies, and inserting on the lesser trochanter of the femur, the hip flexors' reverse muscle action is lumbar extension. Again, when standing with the hip at end range of motion of the hip flexors, the iliopsoas passively holds the pelvis anterior, and pulls the lumbar spinal segments forward to create a lumbar lordosis. The result of both actions of the hip capsule and hip flexors in hip extension is a stable hip and anterior pelvic tilt. This is why people tend to stand with anterior pelvic tilts.

The Hip in Sitting

All of the wonderful mechanics of the hip that provide stability in standing are absent in sitting. As soon as one moves into hip flexion all passive stability is lost. The hip capsule unwinds, and

the hip flexors are no longer at end range. The hip, at this point, requires muscle activity to create stability. One cannot sit unsupported without muscle activity about the hip, and the most prevalent direction of pelvic rotation when attempting this is posterior. This is why people tend to sit in a posterior pelvic tilt, and why people with weakness or paralysis of the hip musculature have little choice but to sit posterior.

Why then do some folks sit with an anterior pelvic tilt? This is more difficult to explain, but observation of sitters for a great length of time has led this author to speculate that, in many cases, it may be secondary to disease progression. As a category, people with slow progressive neuromuscular diseases seem to have a greater propensity for an anterior pelvic tilt in sitting. It is possible that people who have experienced normal development, and then experience the slow debilitating process of a progressive neuromuscular disease, maintain a preference for the anterior pelvic tilt, and upright to slightly forward oriented sitting, as this allows them to function. As the muscles that allow the person to sit actively in this position weaken, the tendency to collapse passively into an anterior pelvic tilt and exaggerated lumbar lordosis strengthens. If these individuals do not receive proper training, education, and seating intervention, this persistent tendency can lead to adaptive shortening of both muscle and non-contractile tissues that limit the potential for postural correction.

The Process of Assessment and Intervention

Although this course focuses primarily on seating intervention, it is very important that clinicians and suppliers conduct a thorough evaluation to determine all factors influencing their clients' ability to sit safely and function in their wheelchairs. Intervention is directed towards optimal postural alignment for nondestructive resting postures and preparation for and support of mobility and function. Intervention must be mindful of what people need to do in their wheelchairs, how long they must do "it", and in what environments. People must be supported in a fashion that promotes maximal independence in mobility and function, yet protects them from skin breakdown.

Intervention

In a most simplistic interpretation of a wheelchair seating assessment, virtually any finding will have an implication for intervention in at least one of the four following categories:

1. Angles. Any limitation of postural flexibility will have an impact on the angular relationships of seating supports.
2. Shape. Although many people may have the ability to sit at roughly the same angular relationships, everyone has a unique shape. Their unique shape will determine the contours of the supports chosen.
3. Orientation. Once angles and shapes are determined, the orientation of the seating relative to gravity, method of mobility, and environments of use must be determined.
4. Materials. The choice of materials is tied to many factors including skin care, postural control, breathability and maintenance.

Interventions for the sitter with an anterior pelvic tendency versus the posterior pelvic tendency are very different. Location of support surfaces and orientation of supports relative to gravity are nearly opposite. Lack of attention to these differences often results in people with posterior tendencies sliding out of their chairs, and people with anterior tendencies falling forward away

from their back supports. A basic understanding of these principles will lead to more effective seating intervention for the long term.

Summary

Pelvic tendencies in standing versus sitting are different. An understanding of why this is so is essential for a wheelchair seating practitioner. Assessment of people relative to their predominant pelvic tendency in sitting is a necessary step in determining appropriate seating intervention. Accurate assessment will lead to definition of clear goals and successful interventions. Effective wheelchair seating will help secure long-term optimal postural alignment for nondestructive resting postures and preparation for and support of mobility and function.

Tom Hetzel is an owner and operator of Ride Designs in Denver, Colorado. He can be reached at 866.781.1633, or tom@ridedesigns.com.