STEPPING INTO THE SITTING ASSESSMENT

Most of our daily activity involves the use of our head and arms, occurring or near our body midline, in the area directly in front of us. Since the average person spends a major portion of the day sitting (meals, transportation, school, work, recreation activities), it is important that the person be able to achieve comfortable, symmetrical midline orientation of the head and arms in this position. There has been a great deal written about the normal human anatomy and its adaptation to the sitting position. Chairs have been designed for office workers with special attention given to work surfaces, as well as critical heights and angulations that allow for optimal work with minimal strain on the person’s anatomy.

These issues become even more critical for the person with weakness and disordered muscle tone and movement patterns. These people, many of whom use wheelchairs, depend on a good sitting position in order to perform their best throughout their daily activities. The influence of muscle shortening, joint contractures, weakness and abnormal tone on the sitting posture, and conversely, the influence the sitting posture has on these components, often affects the person’s functional abilities.

Clients with significant weakness secondary to muscular dystrophy may require added support to stabilize the trunk in order to free the arms for movement. Clients with muscle shortening and/or deformity will have difficulty achieving neutral body alignment and will require special accommodation to support body segments in alignment. For clients with uncontrolled, disorganized movement (such as athetosis), proper sitting position may allow enough stability to affect both gross and fine motor control. For clients with spasticity, the imbalance of muscle tone may lead to deformity or asymmetries of posture and movement that interfere with both gross and fine motor control. Inhibition of tone with proper positioning can ensure continued functioning. Even the influence of a subtle tone change may affect comfort and the quality of movement, resulting in the inability to perform to maximum potential.

Many people with disabilities require intervention to assist them in maintaining a functional sitting position. A combination of needed supports creates the type of seating system required to free the client for maximum function.

Since many of these clients are unable to walk or may only walk short distances, this seating system must be mounted on some type of base to allow interaction with the environment. The base may be a stable structure, which allows the seating system to support the person for a specific activity, or it may be a wheeled base, which will allow the person to be moved or move independently (See Figure 1).

The postural support (seating system) and its components should be designed separately from the supportive base. Each section (seating system and base unit) must meet specific goals set by the entire team. The sections must fit together and still allow for change, creating a dynamic functional unit.

Figure 1 — A seating system must mount to a supportive base.
that assists the client in interfacing with the environment.

The base must support the seating system and provide a safe and stable structure from which the client can function. It can provide a stable base to be used in a home or workshop setting, or it can provide mobility. The mobility can be dependent (caregiver propulsion), manual independent (client propulsion via hands or feet) or power independent (client activation via joystick, switches, voice).

The base must meet the goals of the therapy team – to maintain or increase the client’s function in the areas of mobility, transfers, environmental access. The base must also support the seating system and any accessory devices such as a tray, crutch holder augmentative aid or other items needed by the client. The base must also be acceptable to the caregivers if it requires caregiver use. All of the above areas are explored in other chapters.

The seating system must provide whatever supports are needed to achieve the goals set by the team. Using the least amount of external supports possible, the system should, whenever possible, provide enough support to improve postural stability, maintain symmetry, provide comfort, decrease pressure over specific areas and normalize tone if possible. All of the above should assist the client with increasing function in the sitting position.

Assessment
A thorough physical assessment by the medical team is imperative before any intervention is attempted. This evaluation must include a detailed assessment of range of motion with careful notation as to the affect of muscle tone and shortening on surrounding joints and structures.

Additional information must be gathered on muscle weakness and strength, fatigue, joint and skin sensation, skin condition, and the affect of tone with movement. The assessment must begin with the pelvic position and the relationship of the pelvis to spinal alignment.

The spine is the center of the body. Position and function of the head, shoulders and upper extremities are based on the spine, since the spine provides a structure for trunk alignment. The trunk contains the organs for respiration and digestion. Therefore, an erect symmetrical spine will allow better breathing, swallowing and digestion, as well as provide a good base for head and shoulder alignment and control.

All efforts should be directed at maintaining spinal alignment. Efforts should be made to maintain the pelvis in a neutral or slight anterior pelvic tilt to assist with preserving spinal alignment.

During the seating assessment, the examiner must look at the client in both the supine and sitting positions and may need a second person to assist with stabilizing body parts while the limbs are taken through a range of motion.

In the supine position, the examiner should assess lumbar movement by placing a hand in the low back area while attempting to induce a slight anterior pelvic tilt. If pelvic mobility is present, positioning the pelvis in such a manner and then manipulating the hip and knee angles will help the examiner determine the effect of leg position on the pelvis.

With the hand in the lumbar space, the examiner should begin to flex the hips (See Figure 2). Since this is an assessment for sitting, both hips can be tested at the same time. The knees should be in approximately 110 degrees of flexion to eliminate the influence of the hamstring muscle group. If the client has insufficient hip flexion as the hips are flexed, the pelvis will move into a more posterior pelvic tilt, reducing the lumbar curve and creating pressure on the examiner’s hand.

In some cases, as the hips are flexed, the pelvis can be seen to rise off the mat surface. As soon as any pelvic movement is felt, the examiner should stop flexing the hips and do a thorough assessment to determine if one or both of the hips has limited motion.

Throughout the assessment, notations should be made to record the optimal joint angles and limb measurements (See Figure 5). Once the available hip flexion is determined, the examiner should proceed to extend the knee past 90 degrees of flexion, slowly introducing the influence of the hamstring muscle group (See Figure 2).

Some clients have 90 degrees of available hip flexion with the knees in greater than 90 degrees of knee flexion, but as the hamstrings are stretched the pelvis moves into a more posterior pelvic tilt, pulling the lumbar spine into a more rounded position.

At this point some preliminary decisions can be made about the hip and knee angles, which may be needed in sitting to allow main-
tenance of the proper lumbar curve. The examiners can also measure the distance from behind the hip to the popliteal fossa (A<sub>sup</sub>) and from the popliteal fossa to the heel (B), assessing the right and left leg separately to determine leg length discrepancies. Notations should be made to record the optimal joint angles and limb measurements (See Figure 3).

With the client in the supine position, the examiner can use this gravity-eliminated position to assess the alignment of the skeletal segments. Beginning with hands on the pelvis capturing the pelvic crests, with thumbs on the anterior superior iliac crests, the examiner should support the legs and attempt to achieve neutral pelvic alignment.

An assistant can attempt to align the trunk, shoulders and head with the pelvis. The examiners should talk to each other, discussing what they are noticing while the body parts are passively moved, when the client breathes, speaks and attempts to actively move the head and arms.

Once the determination of alignment and rotation are made, the examiner supporting the legs can do an assessment of the available range of movement in the legs in the areas of hip rotation, abduction, adduction, and internal and external rotation.

Each leg should be taken through these ranges while the examiner palpates the pelvic crests and judges the influence of leg position on pelvic and spinal alignment. All of this will assist the examiner in determining the optimal angles available for correct sitting.

Once the supine assessment is complete, the client should be assessed in a seated position where the influence of gravity will affect the body parts. The seated assessment should be done on a table or raised plinth with a thin top surface (See Figure 4). This will allow positioning of the knees in excessive flexion if needed to release the pelvis for passive alignment.

The examiner should kneel, sit or stand in front of the client with hands on the pelvic crests and the client’s knees up against the examiner’s chest wall. The examiner’s assistant should view the client from all angles while the primary examiner uses hands-on techniques to see if neutral alignment of body structures is possible and to see the effect on resultant realignment and function on other body parts.

In addition, this manipulation will afford an opportunity to assess the client’s comfort in various positions and to carefully note changes in breathing patterns, muscle tone, postural control, primitive reflex activity, and so forth.

With the client in the sitting position, the examiner can take additional measurements...
needed for the creation of a seating system (See Figure 5):
1. seating surface to upper pelvic crest (E), to axilla (F), to shoulders (G), to occipital shelf (H), to crown of the head (I);
2. behind the hips to popliteal fossa (A sit) (right and left);
3. popliteal fossa to heel (B) (right and left);
4. heel to toes (N);
5. across the hips (M);
6. across the chest (K); and
7. depth of thoracic spine (L).

If additional supports will be needed the examiner may wish to take measurements. For knee supports: between the client’s knees; outside knee to outside knee, and for anterior chest supports: across the shoulders and from ear to ear (See Figure 5).

This thorough assessment will give the examiner an opportunity to get to know the client and the client’s body so proper intervention can be planned.

Planning the intervention will be covered in the March/April issue.

Adrienne Falk Bergen, a physical therapist and seating lectures is sales manager at Dynamic Medical Equipment, Carle Place, N.Y. Jessica Presperin, an occupational therapist and lecturer, is practicing at Sharp Rehab Hospital in San Diego, Calif. Travis Tallman, a speech pathologist at the CP Association of Middlesex County, in Edison, N.J., conducts seminars on augmentative communication devices.

This is the sixth part of a serialization of Positioning for Function: Wheelchairs and Other Assistive Technologies. Valhalla Rehabilitation Publications Ltd., PO. Box 195, Valhalla, NY 10595; 914/948-1004.