

SEATING CLIENTS WITH INCREASED MUSCLE TONE

A CASE STUDY

Many aspects of wheelchair seating and the assessment process remain the same over various client populations regardless of age or diagnosis. However, seating a client who has increased muscle tone presents some specific and complex challenges. The following case study illustrates some of these challenges.

JT is a delightful 15-year-old boy. He presents with a diagnosis of cerebral palsy, cranial stenosis and optic nerve atrophy. I met with his clinical team and his mother at his school in September 2015. The purpose of my involvement was to assist with problem solving and demonstrate the necessary steps of a seating assessment with his team.

Over the years, JT has used many seating systems and mobility bases. The most recent manual tilt in space wheelchair and custom shaped seating system, which was received within a year of this visit, was not being used, as the seat was “too uncomfortable.” JT could not tolerate sitting for more than an hour (See pictures 1 and 2). The primary areas of complaint were:

- 1) Trunk flexion/collapse with cervical hyperextension leading to compromised feeding;
- 2) Head falling forward after several minutes in the seating system;
- 3) Pressure injury sites on mid-thoracic spinous processes and sacrum.

MEDICAL HISTORY:

JT’s mother reports that JT gets sick a lot in winter with recurring respiratory problems. He has a history of pressure injuries on his spinous processes and tailbone, which were at this time “open and oozing.” He has no reported problems with his hips. JT’s last seizure was in 2009. He receives Botox in his hamstrings and gastrocnemius muscles as well as in his right biceps every three months. His clinical team notices a significant reduction in his tone following this treatment.

EQUIPMENT:

JT wears bilateral ankle foot orthoses (AFOs) and also has a new thoracic lumbar sacral orthosis (TLSO). He wears the AFOs full time, but at the time of our assessment was only able to tolerate the TLSO for less than one hour at a time due to pain and pressure points. The goal is for JT to wear his

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TLSO while in his seating system. His mother reported at the time of our visit that JT’s happiest places to be were in his old tilt in space wheelchair and in his bed. The seating in his old chair is a custom configured bi-angular back support with thoracic lateral supports and a planar seat with medial and lateral thigh supports (See pictures 3 and 4). A towel is used over the back support for added comfort in pressure point areas.

JT sits up to 2.5 hours at a time at school – the longest he sits anywhere. He also uses a sit-to-stand stander in school for 30 to 60 minutes daily. His team believes that the sit-to-stand accommodates his contractures. JT also spends time in prone over a large bolster wedge during school. He has another sit-to-stand stander at home, but his mom cannot get JT into it by herself, so it is seldom used. A home visit was recommended to re-evaluate the process of getting JT in and out of the stander.

ACCESSIBILITY, TRANSFERS AND SLEEP:

JT lives in a house with a small step at the entrance. There is no ramp in place. His family has a wheelchair accessible van with a side ramp. JT travels in his chair in the van by utilizing tie down straps. He travels on a bus for an hour each way to school daily. He is transferred using a hoist most frequently. At times he is transferred just with the assistance of his mother. JT's preferred sleep position is in bed on his back with his lower extremities in a frog position (hips abducted, flexed and externally rotated). JT's favorite activities include "Sid the science kid," swimming and baseball.

CURRENT POSTURE:

On evaluation in his current wheelchair, JT presents with a left pelvic obliquity (left side low), a left pelvic rotation (right side forward), and a posterior pelvic tilt (pelvic thigh angle > 90 degrees). His lower extremities present abducted with palpable increased pressure against lateral thigh supports. In the posterior loading area, JT makes contact only in the mid-thoracic area secondary to a kyphosis. There is no contact between JT and his back support below or above his mid thoracic area. Looking from a frontal viewpoint, the relationship between his ASIS and rib cage is three inches on his right and less than one inch on his left.

When he wears his TLSO in his existing seating system, he gets a stage-1 pressure injury in his left axilla, as well as on the apex of thoracic spinous processes and his left iliac crest.

THE MAT EXAM

In supine on the mat table, JT presents with an open "rectangle" between pelvis and lower ribs (See picture 5 and 6), demonstrating more equal elongation bilaterally and facilitating a deeper respiratory breathing pattern.

He presents with a non-reducible thoracic kyphosis. JT has potential for a normal degree of lumbar lordosis when hip range of motion is respected. When hip range is not respected (and hips are flexed past available range), he is forced into a posterior pelvic tilt resulting in an even greater thoracic kyphosis.

No pelvic rotation or pelvic obliquity was noted in supine when the hips are totally abducted and externally rotated (his preferred sleeping position). We could gain increased hip flexion bilaterally when his hips were fully abducted, 33 inches wide from lateral aspect of knees, (See picture 7) however, this is not functional for getting through doorways. Decreasing the abducted position to a more manageable overall width reduces hip flexion potential: right side pelvic-thigh angle 25 degrees and left side pelvic-thigh angle 40-45 degrees (See pictures 8-10).

JT also has bilateral reduced thigh to lower leg angle due to tight hamstrings, right side more restricted than left (See picture 10).

INTERVENTION:

Sitting on anterior slope seat, rear height approximately six inches higher than front, JT presents with a normal lordosis. He continues to need support for thoracic kyphosis (See picture 11). With hips respected in a

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JT in his current system



View from top down



JT's previous wheelchair



JT in previous wheelchair & seating system



JT in supine



Maintaining good pelvic-rib cage relationship



JT's hips in abduction and external rotation



Measuring for optimal hip flexion



View of JT's desired hip position



Thigh to lower leg angles



Anterior seat slope



Maintaining desired pelvic-ribcage alignment



Without TLSO



With TLSO



JT with new seating and existing foot supports



JT without foot supports

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more open pelvic–thigh angle while allowing abduction and external rotation to approximately 18.5 width between lateral knees, it was noted by all that JT’s rib cage to pelvis relationship greatly improved with the TLSO both on and off (See pictures 12–14).

It was recommended that custom configured seating be built to JT’s specific measurements, accommodating his available range and reducing future migration into destructive postures. Lower extremity/foot supports must accommodate center positioned feet due to hip external rotation and abduction, as well as shortened

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hamstrings. The back support contour must match JT’s spinal alignment and rib cage if he is not wearing the TLSO, but also accommodate sitting in the TLSO. He also needs swing-away, contoured, summer–winter thoracic laterals for transfers, increased contact and to accommodate seating with and without the TLSO. The team felt that the current headrest was adequate.

TRIALING THE EQUIPMENT IS NECESSARY FOR THE CLIENT, FAMILY AND CLINICAL TEAM MEMBERS. IT IS ALSO ESSENTIAL FOR THE PURPOSE OF JUSTIFYING WHY THE PRESCRIBED EQUIPMENT IS, IN FACT, THE MINIMAL EQUIPMENT THAT WILL MEET THE CLIENT’S NEEDS.

JT’s seat support requires pelvic contouring with immersion and envelopment potential in the pelvic area. Stretch covers on the back and seat surfaces will let him sink into the seating materials.

These recommendations could be accomplished by custom molding a seating system or through custom configured seating. Due to JT’s age and anticipated growth, in combination with his past experiences with previous seating, custom configured seating was selected.

To date, we have trialed his custom configured seating. The existing foot–box did not accommodate his hamstring limitations, pulling him forward in the seat with compensatory increased kyphosis and poor head positioning (See picture 15).

When we removed the foot–box and let JT’s lower extremities rest in the position allowed by available range (respecting his limitations as identified in our hands–on assessment), his trunk and head position were markedly improved as can be seen in picture 16. The next step is to acquire lower extremity supports, which will accommodate his needs.

TAKE AWAY MESSAGES:

- 1) The hands–on evaluation is a critical part of this process and, for me personally, it helps me understand the presenting symptoms as well as the underlying causes of the client’s postural presentation and related challenges.
- 2) Respecting the hips is key to sitting successfully in terms of postural stability, postural alignment, skin integrity, as well as respiratory and digestive function.
- 3) Translating assessment findings to product parameters, highlighting the positive and negative potential outcomes to everyone on the team, is essential.
- 4) Trialing the equipment is necessary for the client, family and clinical team members. It is also essential for the purpose of justifying why the prescribed equipment is, in fact, the minimal equipment that will meet the client’s needs.
- 5) Remember to document the consequences of the client not getting this essential equipment

Visit www.seatingsolutionsllc.com or <https://twitter.com/SharonSeating> for more information.

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