THE DANGERS OF "I'VE SEEN THIS 100 TIMES BEFORE"

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I first encountered this client working as a physical therapist in an inpatient rehabilitation setting. It was a typical busy and hectic day like so many others. I looked at my full schedule and thought to myself, "I need to be on top of my game to get through this busy day efficiently." My 10 o'clock client was a 37-year-old gentleman who had experienced a spinal cord injury three weeks prior. He was an active young man who was a father, worked a full-time job, and loved to fish and be outdoors. I remember as I looked through the client's chart that I had a sense of comfort knowing that I had seen clients with paraplegia hundreds of times in my career. As I first met the client, I thought to myself, "This should be relatively straight forward and easy," and my mind was already moving toward the "go to" things that I often prescribe in clients with this diagnosis.

One common error easily made in our profession is complacency. For those of you who have practiced in Complex Rehab Technology for many years, you know that it is easy to slide into a safety zone despite your best efforts to stay fresh. It is easy to repeat the same process over and over, making decisions based on the hundred other cases that you have seen just like this one. It is essential to stay up to date with an industry of constantly evolving technology. As a physical therapist, I strive to familiarize myself with current literature, products and available technology as a part of my standard practice. What happens when the straight-forward client does not "fit the mold" — responding differently to a seating intervention that has worked for hundreds of clients with a similar diagnosis and presentation? Let's discuss this exact scenario for our 37- year-old client who did not respond to my standard seating interventions.

There are over 17,000 new cases of spinal cord injury in the United States each year. Many of these individuals living with a spinal cord injury need to establish a trusted relationship with a clinical team that specializes in seating and wheeled mobility for the rest of their lifetime. This clinical team often consists of a physician, physical therapist, occupational therapist and wheelchair supplier. Each team member plays an integral role and has a unique perspective in understanding the individual client's function, mobility and specialized wheelchair needs.

Spinal cord injury results in a cascade of secondary effects that may result in paralysis, diminished sensation, respiratory complications, neurogenic bowel and bladder, pain, and spasticity. These effects contribute to a laundry list of problems and create major complications for a person living with a spinal cord injury. One common example is skin breakdown due to lack of sensation, mobility, shearing and incontinence. Early intervention through optimal seating, positioning and wheeled mobility is paramount in prevention of long-term complications, especially in those living with paralysis.

Our client presented with a T8 incomplete ASIA Impairment Scale B injury (sensory incomplete) resulting in paraplegia. He did not have any co-morbidities or prior medical complications. His motor complete paralysis was characterized by generalized hypotonicity and neurogenic bowel and bladder. In the three weeks he was hospitalized, he experienced several complications related to his spinal cord injury including pneumonia, a urinary tract infection and a stage 2 pressure wound over his coccyx/sacrum. His functional self-care and mobility were impaired by poor trunk control and decreased balance, which is common in many clients with a new spinal cord injury. He required minimal assistance for sit pivot transfers from his wheelchair to household furniture and was able to perform manual pressure relief techniques including forward and lateral trunk leaning with independence.

When I first encounter a client in the clinic, I often find myself using the International Classification of Function (ICF) Model as a road map to break apart complex cases into a prioritized problem list. The ICF model classifies the individual client's health condition into three main categories: body function/structure, activity and participation. These categories are interrelated and are uniquely affected by two subcategories including environmental factors and personal factors. By using the ICF model, I not only address the client's medical needs, but also ensure that the client is assessed as an individual, rather than a diagnosis seen a hundred times before.

I found myself creating a prioritized problem list to best address this client's seating and mobility

FIGURES 1 & 2 Before intervention, side and front views

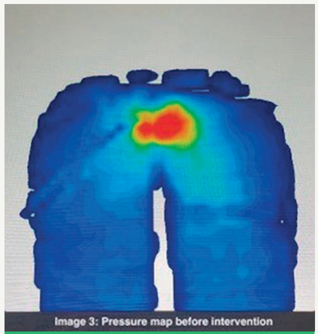

FIGURE 3 Pressure map before intervention

needs based off of the ICF model. He arrived at the appointment to our inpatient seating clinic in a rigid frame, hybrid cushion and an after-market back rest that had been selected by his primary therapy team. This was a trial configuration to determine if these products matched his needs. He demonstrated posterior pelvic tilt, thoracic kyphosis, forward head and rounded shoulders, as well as mild hip abduction of his bilateral lower extremities; however, he was functioning well in the wheelchair (see Figures 1 and 2). The immediate problem list for this client included the stage 2 sacral and coccyx skin breakdown, poor shoulder/trunk positioning, hip abduction and decreased trunk balance.

My initial "go to" seating intervention for a client with T8 paraplegia typically includes a rigid frame wheelchair, some type of hybrid cushion for positioning and skin protection, as well as an appropriate after-market back rest. I usually set up a wheelchair to allow modifications to meet the client's evolving needs when working with someone who has a new injury. For example, a backrest initially positioned higher on back canes to aid in trunk stabilization while the client's postural control is poor but lowered as balance improves. Or arm rests and anti-tippers which may be needed for safety initially but are often not required in the future as wheelchair skills improve. As seen in Figure 1, the client's posture and positioning are not ideal, but did not seem to impede his function. Situations like this can often fall through the cracks because a less than desirable posture does not result in immediate problems. But what would the long-term ramifications for this client be if this "less than ideal" positioning is not addressed?

When paralysis is present, it is common for the client to seek a position of stability. Due to a decrease in trunk control and balance, the client often seeks stability through a posterior pelvic tilt. A posterior pelvic tilt increases the contact area of the pelvis on the seating surface and, as a result, provides a sense of improved stability. Despite the client's increased stability, posterior pelvic tilt contributes to a cascade of negative effects including thoracic kyphosis, forward head/neck positioning and transfer of weight distribution from ischial tuberosities to that of the sacrum and coccyx. Respiratory capacity may be affected by thoracic kyphosis. The long-term effects of posterior pelvic tilt positioning often result in sacral and coccyx deep tissue and pressure injuries, shoulder related pathology including impingement and rotator cuff injury from repetitive use of shoulder with poor mechanics, and neck pain due to the forward head posture and capital extension of the client's neck.

Common interventions depend on whether the client's posterior pelvic tilt is reducible or non-reducible. One of the first lines of defense for correction of pelvic positioning is a positioning cushion. In the case of this client, his posterior pelvic tilt was reducible due to the hypotonic muscle tone and acuteness of his injury. Several different cushion designs made of various materials were trialed to remedy his posterior pelvic tilt while also providing adequate pressure relief including foam, air and fluid. Despite cushion designs aimed at achieving a neutral pelvis, the client's pressure mapping continued to reveal increased sacral pressure (see Figure 3).

I realized that the interventions I traditionally use were not solving this client's positioning problems. A standard rigid frame, positioning cushion and rigid back support were not sufficient to achieve ideal positioning in this client's case. I consulted with the seating team prior to the formal wheelchair evaluation. The wheelchair supplier suggested that instead of trying to neutralize the pelvis and hips through a cushion only, a trial of a more aggressive wheelchair frame design to help capture the client's pelvis was warranted. Our seating team recommended a trial of "Ergonomic Seating" on his TiLite rigid frame. This addition to the frame was selected to provide a pelvic shelf in combination with seat tapering to give further support to the pelvis not achieved through cushion trials alone. The client was measured from the posterior buttocks to the anterior superior iliac spine with an inch added to determine where the wheelchair frame begins to bend upwards to create a shelf. This shelf aids to prevent the pelvis sliding forward into posterior

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FIGURE 4 TiLite Ergonomic Seating

pelvic tilt positioning (see Figure 4). In this case, the ergonomic frame design achieved the positioning that the client and team desired. To address his hip abduction, seat taper through the frame was used with a back seat width measured at 15 inches and front seat width measure at 13.5 inches. This seat taper provided a more contoured fit to allow for neutral hip position. The tradeoff of seat taper was mild contact of the wheelchair frame against the client's lateral lower leg. Despite this contact, boney prominences of the lower leg such as the fibular head were not impacted. With trial of the frame, skin remained intact without compromise.

The next decision was determining the optimal cushion and back. Air cushions are not always our first choice for aggressive pelvic positioning. However, in this case, an air cushion was trialed to meet the more aggressive bends of the wheelchair frame. A full air cushion molded to the bends of the frame, as well as provided appropriate pressure relief to boney prominences. An immediate improvement of the client's static seated posture was noted: a neutral pelvic position with elimination of his thoracic kyphosis, forward head and rounded shoulders (see Figures 5 and 6). Pressure mapping with this new frame and cushion configuration confirmed that the pressure was shifted off his sacrum and coccyx (see Figure 7). When determining the back support, the team considered height, contour, weight and position. A 10-inch, mildly contoured back was selected and positioned roughly 2 inches below the inferior angle of the client's scapula. This back provided posterior support to the client's pelvis and trunk, allowing for improved balance, alignment and comfort.

As a physical therapist, I was next concerned about the client's posture with dynamic movement in function and mobility. Could the client scoot forward in his seat for transfers in such an aggressive frame? Would his static postural improvements remain during propulsion and other dynamic activities? There are many considerations for wheelchair frame design beyond static seated positioning. In this particular client's case, this intervention worked during dynamic activities. This success helped to seal the deal for wheelchair frame design as it solved our client's priority problem list while providing independent mobility.

As Assistive Technology Professionals, physical and occupational therapists, and wheelchair suppliers, we are very fortunate to work in an era of constantly evolving and improving complex rehab technologies. These improvements allow us to better meet the needs of our clients, but not without challenges. The evolution of our industry requires constant learning to stay up-to-date. There is so much technology available at our fingertips and, as in the case of this client, it takes a combined effort of the entire seating team to match the right technology for each individual client. It is important that we do not fall into the habit of placing a client into the "I have seen this a hundred times before" category. Remember to look at every client as an individual in order to fit them with the best available technology to provide optimal outcomes.

FIGURES 5 & 6 After intervention, side and front views

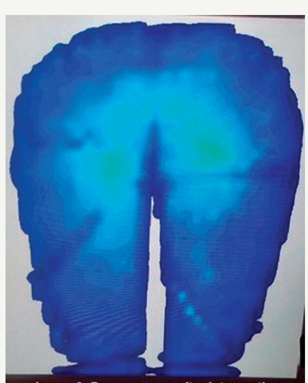

FIGURE 7 Pressure map after intervention.

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