

Re-ordering a wheelchair for a spastic cerebral palsy adolescent: a case study.

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Abstract

The purpose of this case study was specifically intended to reinforce the necessity for proper positioning in the wheelchair using a spastic cerebral palsy patient as an example. The patient sat in the wheelchair with the pelvis sliding forward, uneven weight distribution on both hips, hip adduction, neck extension, and forward trunk bending. The abnormal posture observed was first corrected by seating the patient well back in the wheelchair with the patient's weight evenly distributed between both hips and with no observable pelvic obliquity. A seat belt, firm foot rest, abduction wedge, and special "H" chest strap were inserted to help the patient maintain the corrected posture.

Points to consider when ordering a wheelchair and adaptive equipment are reviewed. The optimal sitting position and positioning objectives and considerations, as well as the selection process, are also presented. Inclusion of the patient and the caregivers in the selection and decision-making processes helps lead to successful results. A thorough assessment of the patient's prognosis and environment is important to prevent harmful, expensive, and disappointing results. On-going reviews of the patient and use of the equipment is helpful in preventing deformities and other problems. As is already known, increasing the patient's function and ability to move around and explore the environment can effect the patient's attitude as well as quality of life.

Key words : wheelchair positioning, seating, spastic cerebral palsy, adolescent, wheelchair ordering, adaptive equipment.

Introduction

As a wheelchair-bound cerebral palsy child grows, the initially provided wheelchair "shrinks". Stability and support significantly decrease. Most likely, the best solution is the purchase of a new wheelchair that will provide the correct positioning and support to maximize the patient's function and life-style. Assessment of the child's physical condition and the world in which most of the child's time is spent is required. The wheelchair and accessories need to be selected very carefully to avoid disappointing, expensive, and maybe harmful outcomes. However, as every patient presents different problems, the initially provided accessories may need alterations. Therapists

and patients should work closely together in trying out equipment and making the necessary changes.

This article will review the present state of the art in wheelchair positioning for the physically handicapped patient. Transporting the disabled is a challenge, as comfort must be provided while maximum function must be maintained. There is a wide variety of wheelchairs and accessories available in Japan from which to choose. Making the proper choices can be a long and difficult process that needs constant attention and reattention for the medical staff, the patient and the caregivers involved.

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Seating Objectives

Wheelchairs are intended to support the patient in as upright a posture as possible, with adaptations used to compensate for inability to maintain the upright position¹⁾. In selecting a wheelchair, the patient's level of awareness, physical and psychological needs, functional abilities and disabilities, and quality of life must all be considered. Whenever possible, the patient and/or caregivers should play an important part in the selection of the wheelchair and adaptations chosen.

The optimal sitting position is hips, knees, and ankles at 90°, with support evenly distributed under the thighs, under the feet, and under the forearms at elbow height. The back and seat angle should be about 95° to compensate for kyphosis. When positioning handicapped clients, we often have to deviate from this optimal position to accommodate contractures, abnormal postural tone, etc., but we should retain the basic principles of good positioning: even weight distribution, adequate stability and comfort.

In positioning, we also try to normalize postural tone, control abnormal movement, promote normal neuromuscular development and increased function, and prevent the development or increment of deformities²⁾. Increasing the patient's ability to move around and explore the environment can affect the patient's attitude and quality of life³⁾. Comfort and feeling of security are essential aspects to be considered. Adequate respiration and prevention of decubiti are important factors as well. The cosmetic effect, in which people respond in a more accepting manner to someone who is sitting in a wheelchair rather than lying in bed, is something we should all be aware of. And, an extremely important point is that of safety at all times.

Selecting a Wheelchair

A very careful and thorough assessment of the patient, the prognosis, and the environment is important to prevent harmful, expensive, and disappointing results⁴⁾. The patient and the care-givers should present their goals and opinions. The wheelchair and adaptations can then be selected. If possible, a seating team can usually provide the neces-

sary advice at this point. Often a seating team consists of a physical therapist, occupational therapist, medical physician, biomedical engineer, and equipment sales representative. Again, the seating team can be of great help with on-going reviews of the patient and use of the equipment. Regular meetings are helpful to assess the value of the equipment and to review whether or not changes are necessary. There are many types of wheelchairs and adaptive equipment to choose from⁵⁾. Important accessories include footrests, safety belts, lap boards, removable armrests, high backs, brakes, tires, cushions, and various pads. Often forgotten is that wheelchairs need to be checked and maintained, including spokes, tires, bolts, upholstery, etc. Oiling and tightening of bolts should be done routinely. Cleaning and keeping the wheelchair dry will help lengthen the time the chair will last.

Positioning Considerations

Correct posture is very important, and the physical problems must be considered, as well as positioning, to enable the patient to use the least amount of energy directed towards remaining seated^{6,7)}. Usually, the best posture is that which approaches a normal sitting position, but this may change according to particular activities. Provision of enough stability in one area, such as the pelvis, often promotes mobility in another area, such as the head and arms. As the pelvis is the major base of support in the sitting position, the evaluation of the pelvis is of utmost importance. Observe any obliquity, anterior or posterior tilt, hip abduction or adduction, fixation, or joint dislocation. The use of hip pads, adjusted seat angle, or chair reclining may help to support the pelvis. A hip abduction wedge is often used. The angle of the seat belt to the chair seat should be 45°, and the belt should cross over the pelvic anterior superior iliac spines. But most important and often forgotten is to be sure the patient is positioned well back in the chair with the pelvis and hips in the best alignment obtainable.

Trunk support, such as a strap, scoliosis pad, cushion, contoured or molded back support, may be necessary. A lap-board, as well as a reclined chair, can help maintain

the trunk erect. The patient needs to be continually checked for discomfort or pressure areas with any form of equipment⁸⁾.

The wheelchair seat width should be 5 centimeters wider than the patient's buttock width. The wheelchair seat depth should be at least 2.5 centimeters less than the patient's seat length⁹⁾.

Case Study

A 14-year-old spastic cerebral palsy child, H.M., had out-grown her wheelchair, and a new one had to be ordered. Prognostically, she is and probably always be wheelchair-bound. She cannot walk or transport effectively without the use of a wheelchair. She boards during the week in a facility for severely disabled children and goes home on the week-ends. The school she attends is attached to the facility, so she can independently maneuver around in her daily environment in her wheelchair. Her home has been altered to allow her to go up to and through the front door. Inside the home, she is transported by her family members to adequately attend to her needs.

This patient has spasticity in all extremities, the lower extremities more than the upper extremities. Trunk tone is low. The left hip is dislocated. A bilateral hip adductor release was done previously. Therefore, the dangers of further contractures and deformities is continually present.

Functionally, she uses her left hand for feeding and using the computer. In the wheelchair, she tends to slide forward, lean forward, and exhibit abnormal lower extremity patterns, including hip adduction. (Figure 1.) She also tends to over-extend her head to raise both her head and trunk to be able to use her eyes and hands. (Figure 2.) She communicates well verbally and is well-adjusted psychologically. She needs moderate to maximal help for dressing, toileting, bathing, and transfers. She can propel and maneuver her own wheelchair. She can be placed in side-sitting, supine, and prone only. Range of motion is normal for the upper extremities. In the lower extremities, limitations are noted in all joints.

Unfortunately, no seating team is available in this facility, but all the staff members involved, the patient, and the family were

consulted about what type of wheelchair would fit her growing needs. As the patient is able to express her needs in detail, her opinions were given priority, which also resulted in her becoming very eager to accept the changes. The wheelchair manufacturer was contacted and asked to provide the



Figure 1 Previous wheelchair



Figure 2 New wheelchair

patient with the proper wheelchair. It required many fittings, consultations, and remaking.

A new and larger wheelchair was ordered to fit her larger size. All of the alignment specifications mentioned above were automatically incorporated into the wheelchair. In addition to these requirements, the back was specially made of mesh, as this patient perspires a great deal. It also included a firm footrest and abductor wedge to keep the lower extremities in good alignment. Sitting the patient well back in her wheelchair with her weight properly positioned on both her iliac tuberosities and using a seat belt at a 45° angle to the seat helped to prevent the patient from sliding forward. Although these changes provided her with a good base of support, her low trunk tone prompted her to continue to lean forward. Consultations and many, many revisions of a specially designed "H" chest strap finally resulted in better trunk positioning. (Figure 3.)

It took six months to finally obtain a wheelchair that the patient could be satisfied with, but it resulted in better head and trunk postural alignment and better seating comfort. The wheelchair is checked on a regular six-month basis to be sure that it is kept in good working condition and to provide any necessary changes.



Figure 3 New wheelchair with "H" chest strap

Summary and Conclusion

Following a program of wheelchair positioning evaluation and adaptation, a spastic cerebral palsy adolescent patient showed better postural alignment and increased seating comfort. Careful attention to pelvic position while placing a patient in a wheelchair is the first and most important step in good wheelchair positioning. Once this step is done, the necessary adaptations and/or equipment can be determined^{10,11,12}.

Further studies are recommended in which the following additions can be done: measurement of range of motion in the wheelchair before and after changes; evaluation and measurement of a change in performance, comfort, and/or activities of daily living with proper positioning; objective measurements of the benefits for the patients; and/or electromyographic analysis of positioning changes.

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