Big Implications for Little People

Weak Breathing Muscles and Function for Persons with Dwarfism

By Dr. Darwyn Bartsch, PT, DPT, and Gem Bartsch, FNP-BC

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A Case Study

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About the authors:
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Over the years, researchers and clinical studies have looked at the issues of weak respiratory accessory muscles. These studies and papers have consistently found a direct relationship between weak respiratory muscles and posture (Hodges, Gurfinkel, et al., 2002; Siafakas, Mitrouska, Bouros, Georgopoulos, 1999; Hodges, Heijnen, et al., 2001; Gandevia, Butler, et al., 2002), endurance (Shahrizaila, Kinnear, Wills, 2006; Syabbalo, 1998), language development, voice quality (Huber, 2008), mobility (Buchmana et al., 2008), cough quality (Park, Kang, Lee, Choi, Kim, 2010), shoulder and fine motor skills (Lauer, Prosser, 2009; Ludewig, Reynolds, 2009; Masery, 2005), and learning (Reilly, van Donkelaar, Saavedra, Woollacott, 2008).

Clinical studies have consistently found a direct relationship between weak breathing muscles and quality of life.

Weak breathing muscles are a common issue in many diagnoses and conditions, and Little People are not exempt. The purpose of this case study is to review the impact of weak breathing muscles, and identify implications for Little People by sharing the story of one child's response when using a targeted exercise approach to strengthen the respiratory accessory muscles.

What happens when a targeted exercise is used to strengthen weak breathing muscles?

Child "C", a 5 year old with Achondroplasia, was referred to physical therapy. Her mother expressed concerns following the child's annual appointment with her doctor. The physician had stated that the child's posture, sternal depression, and general chest shape were worsening and the child would most likely require surgery by the time she was near her early teens. The mother consulted Physical Therapy for alternatives to minimize the worsening thoracic issues.

Child "C" experienced a number of issues typical for Little People.

The assessment of her functional challenges, posture, and parental concerns identified the following:

- Kyphotic (rounded) back posture with sitting
- Depressed sternum
- Lordosis with protruding abdomen
- Flaring ribs
- She had never been able to touch the top of her head; shoulder range of motion to 90 degrees flexion and

She had a kyphotic (rounded) back with sitting

At age 5, she had never touched the top of her head

An alternative approach was taken to address the underlying weakness – that of the small (accessory) breathing muscles

Her improvements were significant

abduction
- Weak cough
- Frequent coughing episodes resulting in vomiting several times per day
- Poor endurance; she was frequently carried for family outings and activities
- Loud breathing sounds at night; her breathing could be heard from other rooms of the house
- A reverse-C sleeping posture; i.e. sleeping on side with excessive neck, thoracic and lumbar extension
- Apneic episodes
- Minimal chest rise with inspiration

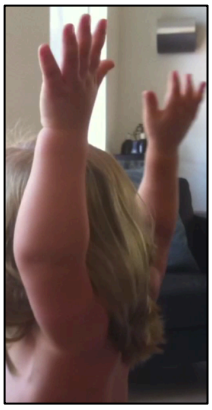
Child "C" presented with a number of issues typical for Little People. Although physical and occupational therapy had previously been involved with her habilitation and rehabilitation, the above issues had not been addressed.

An alternative approach was taken to address the underlying weakness of the small (accessory) breathing muscles. Child "C" was fitted for The EmBrace® Exercise Device (patent pending) to strengthen the accessory breathing muscles. The protocol of wearing it for three hours per day was initiated. Her parents were diligent in using it as instructed for six months. Adjustments were made at monthly intervals according to the instructions for use. No other therapeutic interventions were used during the six months of using The EmBrace® Exercise Device (patent pending).

The changes in Child "C"'s posture and function were notable, as outlined below:

- She now sits with a straight-back posture for extended periods of play
- Reduction of sternal depression
- Resolved flaring of ribs
- Significant reduction of protruding abdomen
- Can touch the top of her head; shoulder range of motion to 170 degrees flexion and abduction
- Strong cough
- Resolved the episodes of vomiting when coughing
- Good endurance; no longer carried for family outings and activities
- No loud breathing sounds at night
- No reverse-C sleeping posture; sleeps in a variety of postures during the night
- No apneic episodes since month #3 of using The EmBrace® Exercise Device (patent pending)
- Good chest rise with inspiration

A significant change occurred in this child's function, abilities, and sleep, when the core problem was addressed: the medical community must not overlook this underlying issue. Clinicians



She can now reach above her head

and therapists are in a position to identify this common concern, but a realization is needed that the symptoms of poor endurance, weak voice, weak cough, poor posture and head control, along with restricted shoulder range of motion include a root cause of weak respiratory accessory muscles. A simple screening would identify individuals who could benefit from exercise that targets these muscles.

Until now the treatment options have been limited. The most widely recognized approach uses a form of airflow restriction such as an expirometer or inspirometer.

The EmBrace® Exercise Device (patent pending) activates the respiratory accessory muscles to work harder than they normally do, and as they become stronger there can be a significant improvement posture, vocal abilities, cough quality and/or arm function.

In general, the link between weak breathing muscle strength and function cannot be emphasized enough: these muscles directly impact almost every component of development and function for children and adults.

Her life and abilities have forever changed!

The EmBrace® Exercise Device (patent pending) is a new exercise option to strengthen weak respiratory accessory muscles. A strong upper core is essential for functional skills. This can be a tremendous benefit for Little People.

Child "C's" life and abilities have forever changed! She is a good example of how significantly life can be affected when the respiratory accessory muscles are strengthened using The EmBrace® Exercise Device (patent pending).

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