TheraSuits and Other Fancy Stuff: Orthotic and Therapeutic Considerations

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Disclosures
Nothing to disclose
No relationship with any of the programs or devices discussed

Presentation Objectives
To review the epidemiology and rehabilitation issues for children with cerebral palsy
To gain knowledge about various therapeutic techniques and devices
To review of the evidence to support these techniques and devices
To gain comfort with addressing parental concerns questions
What is Cerebral Palsy?
Consensus Definition

“CEREBRAL PALSY describes a group of disorders of the development of movement and posture, causing activity limitation, that are attributed to non-progressive disturbances that occurred in the developing fetal or infant brain. The motor disorders of cerebral palsy are often accompanied by disturbances of sensation, cognition, communication, perception, and/or behavior, and/or by a seizure disorder.” International Workshop on Definition and Classification of Cerebral Palsy, 2004

Cardinal Features of CP

- Neuromotor control problem that affects movement and posture
- Non-progressive (static encephalopathy)
- Symptoms change over time
- Injury or anomaly is present early
- There is no cure

Epidemiology of CP

- Most common cause of significant childhood disability
- 2-2.5 per 1,000 live births
- ~8,000 new diagnoses in the US each year

Prognostication

- The question all parents ask: Will my child walk? Most of the time the answer is yes.
- Spastic hemiplegia - most walk at 12-18 months, nearly all by 3 years
- Spastic diplegia - 80-90% walk in some fashion, usually by 4 years
- Spastic quadriparesis - 10-50% walk, 25% are dependent for all activities
The Pediatric PM&R
Physician’s Role

- Confirms and clarifies the diagnosis
- Addresses therapy needs, mobility, function and equipment
- Helps direct care to appropriate providers
- Advocates for the child
- Helps child and family actualize potential and minimize negative symptoms

Addressing therapy and equipment needs to improve function

- Typical therapies: PT, OT, SLP
- Adaptive equipment: bracing, mobility aides (wheelchairs, walkers…), communication devices, ADL equipment

Does therapy work?
- Yes – shown in multiple studies

Does more therapy work better?
- Sometimes but the issue is long term carry-over


But What About???

- The Therasuit/Adeli Suit
- Theratogs
- Hyperbaric Oxygen Therapy
- Hippotherapy
- Conductive Education
- Patterning
- Craniosacral therapy
The TheraSuit

“Its major goal is to improve and change proprioception (pressure from the joints, ligaments, muscles), reduce patient’s pathological reflexes, restore physiological muscle synergies (proper patterns of movement) and load the entire body with weight”.

http://www.suittherapy.com/

Benefits as Touted by TheraSuit

- Re-trains central nervous system
- Restores ontogenic development
- Provides external stabilization
- Normalizes muscle tone
- Aligns the body to as close to normal as possible
- Provides dynamic correction
- Normalizes (corrects) gait pattern
- Provides tactile stimulation
- Influences the vestibular system
- Improves balance
- Improves coordination
- Decreases uncontrolled movements in ataxia and athetosis
- Improves body and spatial awareness
- Supports weak muscles
- Provides resistance to strong muscles to further enhance strengthening
- Improves speech production and its fluency through head control and trunk support
- Promotes development of both fine and gross motor skills
- Improves bone density
- Helps to decrease contractures
- Helps improve hip alignment through vertical loading over the hip joint

The TheraSuit Method

“This intense program is ideal for those who want to enhance & improve the child's developmental & functional abilities (ex: mobility, balance & coordination, gait, etc.).”

3-week session with the child being seen 5 days per week for 3 hours per day

Cost per week is $1,650.00
Adeli Suit

- The precursor of the TheraSuit
- Developed in Russia in the 1971
- The Adeli Suit consists of a vest, shorts, knee pads and specially adapted shoes with hooks and elastic cords that help tell the body how it is supposed to move in space. Therapists use the Adeli Suit to hold the body in proper physical alignment. During specialized exercises, the therapists adjust the elastic connectors that topographically mirror flexor and extensor muscles, trunk rotators and the lower limbs.

Evidence for the Adeli Suit/TheraSuit

- Numerous testimonials and case reports (mostly unpublished)
- Comparison of Suit therapy versus neurodevelopmental treatments failed to show differences between the therapy types, both groups showed small but significant improvements in efficiency index of stair climbing (Bar-Haim 2006)
- Dr. Edward Dabrowski at the Children’s Hospital of Michigan reported the results of 57 children, all of whom received an hour of physical, occupational, and speech therapy three times a week for 8-10 weeks followed by a 4-week home program. The experimental group wore the Adeli Suit for the last 4 weeks of their therapy program. Both groups improved and sustained their improvement without any statistical difference in results between the 2 groups. (UCP Research and Education Fund April 2004)
TheraTogs

“TheraTogs are comfortable, breathable garments that support and reinforce what an occupational or physical therapist’s hands do to help the physically impaired correct postural or biomechanical problems.”

http://www.theratogs.com/

Theory and Evidence for TheraTogs

- Theory: the material allows for mechanical forces to be applied to the patient without the use of the therapist hands
- Evidence: testimonials, case reports (unpublished)
- Cost: about $1000 for a full suit, insurance sometimes covers costs

Hyperbaric Oxygen

- Delivery of 100% oxygen under pressure (1.5-1.75 x atmospheric pressure) in a chamber in which the child and parent or therapist does activities
- Usually treatments are 1-2 hrs per day 5 days a week for a month
- Potential side effects include: ear pain, eardrum perforation, pneumothorax
- Cost: $400 per 90 minute session (McDonagh 2007)
What does HBOT do?

- Touted to improve oxygen delivery to the dormant cells around the damaged cells that may then be stimulated to function normally
- Based on the ischemic penumbra theory

HBOT - Evidence

- Design: multi-center, double blind, placebo controlled
- Subjects: 111 children, 3-12 yrs. with spastic CP
- Intervention:
  - 40 - 60 minute sessions of 100% O2 at 1.75 ATA or RA at 1.3 ATA
  - Conventional therapies and spasticity medications held 6 weeks prior
- Standardized outcome measures
  - Baseline, 20th session, 40th session, and 3 months later
- Results:
  - Significant improvement in gross motor skills, working memory, attention, language and self-care skills in both groups

Evidence for HBOT

- Systematic review in Developmental Medicine and Child Neurology found insufficient evidence to support the use of HBOT, several studies show similar improvements when HBOT is compared with pressurized air (McDonagh 2007)
- Review by Liptak points out the potential effects of highly motivated parents (Liptak 2005)
- Side effects are sometimes severe
Hippotherapy

- Theory: horseback riding improves head and trunk control, mobility, pelvic stability and improves range of motion
- Risk: fall from horse

Evidence for Hippotherapy

  - 11 quantitative studies with acceptable design evaluated hippotherapy or recreational horseback riding (not performed by a licensed PT/OT)
  - 10 of 11 showed improvements in gross motor function

Conductive Education (Darrah 2004)

- First developed in the 1940s by Dr. Andreas Peto in Hungary
- A model that blends therapy techniques in an educational model
- Carried out by trained ‘conductors’ in group settings
- Structured activities are broken down by tasks into series of steps of intentional activities versus isolated exercises
  - Rhythmic intention: uses song and rhyme coupled with a motor activity to facilitate learning

Example Study for Conductive Education

- Blank et al studied typical special education and 2 hours of PT/OT per week versus 12 weeks of conductive education for 7 hours a day, 5 days a week with an outcome measure of coordinated hand function
  - CE improved coordinated hand function by 20-25%, while the typical program did not (Blank 2008)
Evidence for Conductive Education

- Plethora of research ranging from descriptive studies to controlled trials
- Of the 20 studies that showed statistically significant difference between therapeutic types, 10 showed improvement with Conductive Education and 10 showed improvements with standard therapies (Darrah 2004)

Patterning

- Developed by Fay, Delacato and Doman in the 1950-60s.
- Principle that typical development progresses through a sequence that if impaired inhibits the development of the subsequent stages
- Hypothesis: passively repeating the sequential steps will facilitate developmental skills

Evidence for Patterning

- Many studies ongoing to evaluate this technique for spinal cord injury recovery
- For children with cerebral palsy
  - AAP does not support recommending patterning therapy (AAP 1999)
    - AACPDM, AAPM&R and AAN do not recommend patterning
  - Found to be time intensive without significant added benefit and costly

Craniosacral Therapy

- Theory that a cranial rhythm exists which is linked with movements in the sacrum through mechanical forces transmitted through the dura of the spinal cord
- Goal of therapy is to allow unimpeded flow of CSF
- Light pressure is applied to points along the cranial-sacral axis to restore symmetric impulses
CranioSacral Therapy
- Originated by William Sutherland, DO in 1930’s
- Primary proponent currently is John Upledger, DO
- Used widely for a vast array of disorders and complaints

Evidence for Craniosacral Therapy
- Blinded study show that craniosacral therapists cannot identify the same impulses/channels on the same individual (Spitzer 1990)
- No scientific evidence to support cranio-sacral therapy
- Available literature calls into question the foundation of the technique (April 2000)

Talking to Families
- Take into account the goals and expectations of the family
- Frame goals in a realistic way
- Talk about efficacy and risks
- Encourage critical evaluation of programs and techniques
- Encourage programs with known benefits
If controversial therapies are employed, encourage clear objectives and evaluations.

Remain involved even if you disagree.

Be supportive.

Provide enough time for the discussion.

Investigate sources of information.

Help families understand scientific rigor, placebo effect.

Listen carefully and acknowledge the family’s concerns.

REFERENCES


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