Chronic Pain in the Pediatric Patient: How is the Treatment Unique?

Dawn Belvis, MD
Bonnie Essner, PhD
Laurey Brown, DPT
Erin Hoeman, APN

Ann & Robert H. Lurie
Children’s Hospital of Chicago

What we see in the pediatric chronic pain clinic

- Headache
- Back pain
- Fibromyalgia
- Joint pain
- Epidermolysis bullosa
- Cancer pain

- Abdominal Pain
- Complex Regional Pain Syndrome
- Chest (wall) pain
- Sickle Cell pain
- Cystic Fibrosis

What’s the big deal?

- Sleep disturbances
- Restriction in hobbies and social activities
- Eating problems
- School absenteeism
- Higher depression and anxiety scores
- Utilization of health care resources
  - Office visits
  - Medications

Objectives

- Describe types of pediatric chronic pain
- Discuss the evaluation and treatment of pediatric chronic pain with case example illustration for medical providers, physical therapists and pain psychologists
- Evaluate the prognosis for pediatric chronic pain
- Summarize pediatric chronic pain treatment

The Numbers

- 15-20% of children have chronic pain
  - Pain as compared by moderate to severe disability in 5-10%
    - Huguet & Miro, 2008
- 38% of school age children c/o abdominal pain
- 2-4% of all pediatric visits for abdominal pain
- 14% of high school students have IBS symptoms
- 50% of teens have back pain
- By age 15, 75% of children have had 1 headache
- 83% experience pain within a 3 month period
  - Kambrell et al, Pediatrics 2004

No conflicts of interest
The Goal

* To reduce pain
* To improve function

Approach to Pediatric Chronic Pain

* Interdisciplinary approach encompassing psychosocial and physical needs of the patient
* Pharmacological Therapy
* Physical Therapy
* Cognitive Behavioral Therapy
* Interventional Therapy
* Complementary Therapy

A recent referral

* A delightful 17 year old female presented with bilateral “hip and back pain.” She has been evaluated by orthopedics who considered doing a femoral osteotomy. She had MRI of lumbar spine, which was unremarkable. She had 4 ED encounters where she was administered opioid pain medication. Most recently, she received a left hip injection with steroid.

Faces Pain Scale

Faces Pain Scale – Revised (FPS-R)

<table>
<thead>
<tr>
<th>Category</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face</td>
<td>No particular expression or smile</td>
<td>Occasional grimace or frown, withdrawn, disinterested</td>
<td>Frequent to constant frown, clenched jaw, quivering chin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Legs</td>
<td>Normal position or relaxed</td>
<td>Uneasy, restless, tense, Kicking or legs drawn up,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity</td>
<td>Lying quietly, normal position</td>
<td>Squirming, shifting back and forth, tense</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cry</td>
<td>No cry (awake or asleep)</td>
<td>Moans or whimpers, occasional complaint</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consolability</td>
<td>Calm, relaxed</td>
<td>Reassured by occasional touching, hugging, or ‘talking to’</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

FLACC Pain Scale Scoring

<table>
<thead>
<tr>
<th>Category</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face</td>
<td>No particular expression or smile</td>
<td>Occasional grimace or frown, withdrawn, disinterested</td>
<td></td>
</tr>
<tr>
<td>Legs</td>
<td>Normal position or relaxed</td>
<td>Uneasy, restless, tense, Kicking or legs drawn up,</td>
<td></td>
</tr>
<tr>
<td>Activity</td>
<td>Lying quietly, normal position</td>
<td>Squirming, shifting back and forth, tense</td>
<td></td>
</tr>
<tr>
<td>Cry</td>
<td>No cry (awake or asleep)</td>
<td>Moans or whimpers, occasional complaint</td>
<td></td>
</tr>
<tr>
<td>Consolability</td>
<td>Calm, relaxed</td>
<td>Reassured by occasional touching, hugging, or ‘talking to’</td>
<td></td>
</tr>
</tbody>
</table>
Patient & Parent Questionnaires

Analgesics & Anticonvulsants

- Non-opioid analgesics: NSAIDs/COX-2 inhibitors, acetaminophen
- Opioid analgesics: oxycodone, hydrocodone (limited effectiveness for neuropathic pain)
- Adjuvant analgesics: tramadol…opioid as of 8/2014
- Anticonvulsants: carbamazepine, oxcarbazepine, gabapentin, pregabalin, topiramate

Adjuvants

- Skeletal muscle relaxants: Cyclobenzaprine, baclofen, metaxalone
- Topicals
  - Transdermal lidocaine patches
  - Compounded topical creams (common ingredients: ketamine, gabapentin, clonidine, lidocaine, amitriptyline, diclofenac, carbamazepine)
- NMDA receptor antagonists: experimental ketamine infusions (Schwartzmann, Alexander Grothusen et al. Pain Sept 2009.)

Analgesics & Anticonvulsants

- Other Adjuvants
  - α2 agonists
  - Corticosteroids
  - Magnesium with vitamin B6 (Beelith)
  - Botox (BTX-A) (Chan, VW et al. J Neurosci Nurs. 2009)
  - Vitamin C
    - Effect of vitamin C on prevention of complex regional pain syndrome type 1 in patients with spinal stenosis: a randomised, placebo-controlled, double-blind trial (Schwartzmann, Alexander Grothusen et al. Pain Sept 2009.)

Antidepressants

- Tricyclic antidepressants: amitriptyline, nortriptyline, desipramine, doxepin, imipramine
- Selective serotonin reuptake inhibitors: fluoxetine, paroxetine

Psychotropic Medications

- Reserved for recalcitrant chronic pain syndromes
- Schedule structured physical therapy immediately after block is performed
- Intravenous regional anesthesia
- Continuous lumbar sympathetic catheter
- Continuous peripheral nerve catheter
- Implantable devices
  - Intrathecal devices

Interventional Therapy

- Continuous epidural catheter
- Continuous peripheral nerve catheter
- Intrathecal devices

**Complementary Therapy**

- Transcutaneous electrical nerve stimulation
- Biofeedback – decreases pain scores
- Massage therapy - Reductions in ratings of distress, pain, tension, discomfort, and upset mood
- Mirror Therapy
- Hypnosis/distraction techniques
- Acupuncture/acupressure
- Yoga

* Suresh S, et al.
* Asymmetry in standing with elevated ASIS on L

**Physical Therapy Role in Pediatric Pain Clinic**

- Delve deeper into the child’s functional presentation
- How does this individual’s life look different as a result of his or her pain?
- What meaningful activities is he or she no longer able to perform?
- Past Physical Therapy?
- Assessment
- Assist in Plan of Care and provide Recommendations

**PT Assessment:**

Initial interview most typically with Lower Extremity Functional Scale; Upper Extremity Functional Scale:

- Postural Assessment
- Gait Analysis
- ROM/MMT guided from previous observations
- Balance (as appropriate)
- Performance of Specific Life Tasks

**Case Study**

- Previously dancing 60 hours/week
- LEFS: 34/80
- Usual hobbies, recreation and sport activities
- Running (even and uneven ground; sharp turns while running)
- Past PT
- Multiple occasions – “made it worse”
- Non-compliant with HEP
- Sister with background in Athletic Training
- History of use with foam roller

**Case Study (cont.)**

- Postural Assessment:
  - Preference to cross legs in sitting
  - Asymmetry in standing with elevated ASIS on L
- Gait Assessment:
  - Initial antalgia with improvement following muscle energy technique
  - Decreased strength to L gluteus medius and lower abdominals
  - Ober on involved side
Plan and Recommendations:

- **Future PT**
- Collaboration and discussions with outside/community therapist.
- Timed Tests

---

Plan and Recommendations: (TENS cont.)

- Benefits to TENS for management of chronic pain
  - Non-invasive
  - Non-addictive (still want to minimize dependence)
  - Easy to use
  - Can be used as a home treatment
  - Provides patient a sense of control over symptom management
  - Cost-effective
  - Safe
- Contraindications: pacemaker, pregnancy, areas of known/suspected malignancy, active DVT, active bleeding or untreated hemorrhagic disorder, infected tissue, osteomyelitis, recently radiated tissue, head/neck region of patients with seizure disorders, near or over eyes/carotid sinus, areas of impaired sensory awareness, impaired cognition
- Precautions: impaired circulation, lower abdomen

---

TENS for children's procedural pain

Lander et. Al

- Outcome measures: Faces Pain Scale, Visual Analog Scale, Children's Anxiety and Pain Scale, State-Trait Anxiety Inventory, Parent Questionnaire
- Results:
  - The lowest pain was reported for the TENS group, followed by the placebo-TENS group, and then the control group.
  - Greater pain ratings were reported with younger subjects with mean pain ratings decreasing by age.
  - Subjects receiving TENS were stimulated between 12-22.8 minutes with no significant difference found with increased duration.
  - TENS was found to be statistically significant compared to the other treatment groups in decreasing pain, but this was not clinically significant.
  - May be due to small sample size

---

Plan and Recommendations: (TENS cont.)

- TENS for children's procedural pain
  - Lander et. Al
  - N=514 children aged 5-17 years; no previous TENS, receiving laboratory blood work
  - Subjects randomly assigned to either: TENS, placebo-TENS, and control
  - each intervention group further divided into 6 age groups of 2 yr intervals
  - TENS: 6 electrodes around the arm, pulse width: 1.0 msec, waveform: balanced biphasic, frequency: 200 Hz, intensity: sensory threshold; treatment duration >12 min

---

Plan and Recommendations:

- **TENS:**
  - The Gate Theory by Melzack and Wall: stimulating large, myelinated fibers that don’t conduct pain information (Aβ) branches that go to the dorsal horn, have an inhibiting effect on Aδ and C fibers conducting pain information.
  - Conventional TENS: high frequency, low intensity
    - Frequency: 50-100 Hz to target lemniscal pathway
    - Pulse duration: 2-50 μsec to target Aβ fibers
    - Amplitude: low, comfortable paresthesia

---

Graded Motor Imagery:

- Independent International Group of Physiotherapists
- The Graded Motor Imagery Handbook
- G. Lorimer Moseley; David S. Butler; Timothy B. Beames; Thomas J. Giles
- Complex Series of Treatments
  - Left/Right Judgment Exercises
  - Imagined Movements
  - Mirror Therapy
  - Sympathetic Exercises
  - Targets Neuropathic Pain Problems
  - Complex Regional Pain Syndrome (CRPS)
  - Phantom Limb Pain (PLP)
Plan and Recommendations:

- **Taping:**
  - Assist with initial alignment
  - Improves patient’s recruitment patterns
  - Reinforces postural education

Plan and Recommendations:

- **Community Connections**
  - Aquatic Therapy
  - Community Pain Programs
  - Pediatric Pain Pts local to the patient

Plan and Recommendations:

- **Community Based Programming**
  - Yoga
  - Dance
  - Pilates
  - Pool

Plan and Recommendations:

- **Toys/Devices:**
  - Referral for Custom or OTC orthotics
  - Hip Pillows
  - Foam Roller
  - Postural Supports
  - Move ‘N Sit
  - TheraCane
Case Study

- Postural Education
- Sleeping position alignment
- Instructed in muscle energy alignment technique
- Foam roller
- Modify clothing to improve pressure on area of irritation
- TENS
- Ice

Psychological Evaluation & Treatment - *The Evidence*

- 2012 Cochrane Review: Systematic review and meta-analysis of psychological therapies (RCTs) for children and adolescents with chronic pain
  - Recovered 37 RCTs enrolling n=11938 patients
  - Examined efficacy of psychological therapies for chronic and recurrent pain in children and adolescents compared with other psychological therapies, placebo, waiting list, or medical care on clinical outcomes of pain severity, mood, and disability
  
  [Eccleston, Palermo et al., 2013]

Psychological Evaluation & Treatment - *The Evidence*

- Findings
  - Psychological treatments are effective in pain control for children with headache and results persist post-treatment, RR of 2.90 (p<.05), NNT = 2.72
  - Psychological treatments are also effective in pain control for children with musculoskeletal and recurrent abdominal pain; large effect size of -0.55 (p<.05)
  - There is little evidence available to judge the effectiveness of psychological treatments on disability or mood.

  [Eccleston, Palermo et al., 2013]

Psychology: Clinical Assessment

- Format
  - Self-report forms
  - Patients and their families interviewed together & child, parents separately
  - Behavioral observation, including the child’s general mental status, the parents’ emotional functioning, and the manner in which family members interact

- Domains
  - Pain history, pain beliefs
  - Physical functioning
  - Sleep
  - School
  - Emotional functioning
  - Social functioning & lifestyle
  - Medical & developmental history
  - Family relationships

Psychology: Clinical Assessment

- Pain History
  - Pain beliefs
    - What do you think causes your pain?
    - Is there any explanation for your pain that you have heard that makes sense to you?
    - Treatment expectations
    - What would you like to see happen with your pain?
    - What do you expect with our pain treatment?

  Physical Functioning
  - Typical day
    - What are others doing for the patient since onset of pain?
    - How have physical & daily functioning changed since pain onset and how does child and family feel about this?

Sleep

- Bed/wake times
- Sleep disturbances
- Sleep quality
- Daytime sleepiness
- Sleep hygiene
- Medication use
- Family history

School functioning

- Attendance
- Academic functioning
- Pain management plan
- School-related stressors
Psychology: Clinical Assessment

Psychological functioning
- History of psychiatric diagnoses and treatment
- Depressive symptoms
- Anxiety symptoms
- Disruptive behaviors/contact with legal system

Social functioning & lifestyle
- Peer relationships
- Peer responses to pain
- Romantic relationships
- Diet/nutrition
- Alcohol/Tobacco/Drugs

Psychology: Clinical Assessment

Family functioning
- Who in home/outside of home
- Overall family functioning
- Responses to pain
- Pain management
- Impact of pain on family
- Family history of pain and psychological functioning

Psychology: Treatment

CBT for chronic pain
1. Education

2. Cognitive therapy methods
   - Thought stopping
   - Cognitive restructuring
   - Positive appraisals
   - Continuum technique for cognitive & behavioral flexibility

Psychology: Treatment

3. Relaxation, self-regulatory skills
   - Progressive muscle relaxation
   - Guided imagery
   - Autogenics
   - Meditative practices, mindfulness

4. Behavioral change by operant methods (usually with parent)
   - Activity pacing
   - Behavioral activation
   - Communication skills

5. Generalization and maintenance, relapse prevention

... Back to our case example

Assessment
- Pain Beliefs
  - No idea what causes pain, expect complete pain relief with treatment plan from this clinic
- Physical Functioning
  - Sedentary, very little daily activity, previously danced 6 days per week & participated in school dance team
- Sleep
  - 4 hours sleep per night
- School functioning
  - Attending school without absences

Case Example

Assessment (cont)
- Psychological functioning
  - History of depressive episode several years ago, currently reports subclinical emotional distress
- Social functioning
  - No friends
  - Family functioning
    - Mother severe mental illness
    - Patient and father description of emotional neglect and early responsibility for parenting younger siblings
  - Parents divorced 8 years ago
Case Example

**Cognitive Skills**
**Relaxation, self-regulatory skills**
**Behavioral change**
  * Activity pacing
  * Behavioral activation

**Headache Prognosis**

- 27% headache free in 20 year follow-up
- 66% some improvement

**Prognosis of CRPS**

- More favorable in children compared to adults
- Greater than 90% of pediatric patients are successfully treated
- Possible recurrences in affected limb or contralateral limb, as well as progression of symptoms proximally on affected extremity

**Pediatric Chronic Pain: How it’s different**

- Emphasis on interdisciplinary evaluation & treatment
- Minimal opioid usage
- Rehabilitation approach, less interventional
- Education and collaboration with school
- Psychological treatment emphasizes enhancing family interactions, developing contingencies and involving caregivers
- Focus on sleep evaluation and intervention

**Questions??**

- Please feel free to contact us if you have any further questions/concerns
- Dawn Belvis, MD – dbelvis@luriechildrens.org
- Bonnie Essner, PhD – bessner@luriechildrens.org
- Laurey Brown, PT – laubrown@luriechildrens.org
- Erin Hoeman, APN – ehoeman@luriechildrens.org