Acupuncture for Pediatric Migraines

By Anna Esparham, MD
Clinical Associate Professor
Director Headache Treatment Center
Children’s Mercy Hospital

Disclosures

• I have no relevant financial relationships with the manufacturers of any commercial products and provider of commercial services discussed in this CME activity
• I do intend to discuss off-label therapies for children (acupuncture!)
• Current AAP SOIM Program Co-Chair
• Lhasa OMS – In 2018, Children’s Mercy received needle donations for basic acupuncture curriculum

Objectives

• Be able to discuss with families and patients the benefits for acupuncture and the side effects/contraindications
• Utilize acupuncture as additional tool for headache management
• Understand the evidence for acupuncture for migraine
CMH Acupuncture Team/Research Leaders

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Pediatric Migraine Epidemiology

• Pediatric migraine affects 7.7% of children
• Headache incidence in ages 20 and younger is ~58%

Why Care About Headaches in Children?

• #3 leading cause of disability in the world
• Early intervention is key

Abu-Arafeh I et al. Dev Med Child Neurol 2010
Powers SW et al. Pediatrics 2020
GBDH Collaborators. Lancet Neurol. 2018
International Headache Society Classification III Migraine (www.icdh-3.org)

- Lasts 2 or more hours if untreated
- Must have 2 of the green criteria below:
  - Moderate to severe headache
  - Worse with activity/limiting activity
  - Throbbing/pulsatile
  - unilateral (bilateral often in kids)
- At least one of the purple criteria below:
  - Photophobia
  - Phonophobia
  - Nausea and/or vomiting

Migraine Review

Underlying Triggers and Pathophysiology
- Genes > 38 associated gene polymorphisms
- Environment: Weather changes, barometric pressure, Stress
- Lifestyle: Sleep disruption, Diet/Nutrition, Hydration, Stress
- Metabolism: Neuroendocrine and Mitochondrial Dysfunction
- Hormones: Menstrual Cycle and Pregnancy

Migraine Review

Mechanisms of Migraine:
- Hypothalamic Activation
- Alteration in Thalamo-Cortical Circuits
- Brainstem and Trigemino-Vascular Activation
- Cortical Spreading Depression
- Release Noxious Substances: CGRP & PACAP
Pediatric Migraine Management

- Lack of clinical studies on acute and prophylactic therapy
- Most treatments extrapolated from adult studies
- Conflicting findings
- High placebo response (60% of pediatric patients)
- Paucity of data
- There is no medication with exclusive indication for migraine treatment in pediatric age group

Acupuncture

- FDA Education Blueprint For Health Care Providers Involved in the Management of Support of Patients with Pain – 2017
- NIH National Pain Strategy

“Healthcare providers need to be knowledgeable about nonpharmacologic pain modalities – which ones may be helpful for part of a multidisciplinary management of patients with pain.”

Acupuncture

- History
- Mechanisms of Action
- Evidence
- Safety
- Acupuncture at Pediatric Academic Medical Centers
History

- 1st Document: China, 100 BC:
  - The Yellow Emperor’s Classic of Internal Medicine
- U.S.: 1700s: early editions of William Osler’s Principles and Practice of Medicine

U.S. History

Became mainstream in United States in 1971
- NY Times journalist James Reston visited China to cover President Nixon’s visit
- Developed appendicitis
- Reported his experience with acupuncture and Chinese medicine for post-operative pain relief

1977-1984
- Acupuncture analgesia demonstrated to be linked to CNS activities of endogenous opioid peptides and biogenic amines
- Relaxation of scientific skepticism

Acupuncture

- Mechanisms of Action
  - Activates descending inhibitory pain pathways
  - Releases local substances that relieve pain at needle
  - Reorganizes connective tissue
Neurochemical Basis of Acupuncture and Neurotransmitters

- Opioid peptides
- Substance P
- Gamma-Amino Butyric Acid
- Norepinephrine
- Serotonin
- Nerve Growth Factors
- Second Messengers

Han JS, Terenius L. Annual Review of Pharm & Tox 1982
Han JS, Xie GX. Pain 1984
Kuwazawa J et al. J Showa Medical Assoc 1987
Kondo Y et al. J of Neural Transmission 1993
Cheng RSS. Scientific Basis of Acupuncture 1989

• Acupuncture needles inserted into SQ tissue, fascia, muscle, tendon, periosteum stimulate
  - A-δ fibers
  - Small myelinated group II and III nerve fibers

Pomeranz tables

- Low-Frequency, High-Amplitude Electroacupuncture
  - Midbrain and Pituitary-Hypothalamic
  - Endorphins, enkephalin, dynorphin
High-Frequency, Low Amplitude Electroacupuncture: Spinal Cord -> GABA and Monoamines – serotonin, norepinephrine

Acupoints

- Bundle of dense, loose connective tissue
- Nerves
- Lymphatics
- Vessels
- Areas of connective tissue clefts, depressions

TCM vs Acupuncture Modalities

- Traditional Chinese Medicine, Oriental Medicine, East Asian Medicine Includes:
  - Acupuncture
  - Chinese herbal medicine
  - Nutritional therapies
  - Qi Gong
  - Tai Chi
  - Meditation
  - Shiatsu and other bodywork
  - Moxibustion
  - Cupping
  - Gua Sha
Acupuncture Modalities

• Body acupuncture
• Scalp acupuncture
• Auricular (ear) acupuncture
• Korean Hand Acupuncture
• Moxibustion
• Cupping
• Gua Sha

fMRI studies: acupuncture & migraines

• fMRI studies have demonstrated that acupuncture modulates a widely distributed network of brain areas involved in pain modulation
• Medial pain system – pain pathways projecting to limbic system
• Lateral pain system – thalamus cortex to sensorimotor cortex
• Descending inhibitory pain pathways – from brain to spinal cord

Acupuncture Safety

• Systematic review
• 28 out of 450 studies included
• Total of 156 AE’s out of 1338 patients
• Majority were mild in severity – bruising, bleeding, worsening of symptoms, pain
• More serious AEs caused by substandard acupuncture practice - China from 1983-1989 (12 cases of thumb deformity, 5 infections, 1 case of pneumothorax, cardiac rupture, nerve impairment, subarachnoid hemorrhage, intestinal obstruction, hemoptysis, reversible coma, overnight hospitalization)
Acupuncture as Placebo?

- Many articles written by non-acupuncturists that describe acupuncture as all placebo in the headache field
- Verum acupuncture vs. Sham acupuncture
  - GERAC trials demonstrated no difference for migraine between true (verum) vs. sham (placebo) acupuncture
- Sham acupuncture has multiple mechanisms that decrease pain itself
  - Diffuse Noxious Inhibitory Control
  - Conditions with Affective Components
  - Dorsal root reflex
  - Multiple dermatomes/sclerotomes/myotomes divergence
  - Divergence of sensory input above and below traditional dermatomes/sclerotomes/myotomes

Who provides acupuncture?

- Licensed acupuncturists
- Chiropractors
- MD/DO's

Physicians as acupuncturists

- Wide discrepancy in state laws
- Wide discrepancy in hospital privilege requirements
- American Board of Medical Acupuncture
  - Requires 300 hours of training in an accredited program
  - Most programs are a blend of online learning and hands-on sessions

Bleck RR et al. Training hour requirements to provide acupuncture in the United States. Acupuncture in Medicine 2020
Education requirements vary by state

Licensed Acupuncturist (L.Ac.)
- Master’s Degree (3-4yrs)
- Accredited by the Council of Colleges of Acupuncture and Oriental Medicine
- National Board Certifying Examination

Chiropractors
- Wide discrepancy in training requirements (no formal training needed to 300 hours)
- Not allowed in 16 states

Acupuncture Reimbursement
- Variable insurance coverage
- Increasing Medicaid Coverage
- Medicare coverage for low back pain
- $60-$180 per session
- Billed in 15 minute increments, with or without electrical stimulation

Acupuncture
- Two Cochrane Reviews 2016
  - Acupuncture beneficial for prevention of headaches (tension-type, episodic, migraine)
Acupuncture to Abort Pediatric Headaches

- Children’s Mercy Headache Treatment Center Offers Acupuncture to Abort Pediatric Migraines/Headaches
- Retrospective Chart Review from Sept – Nov 2018
- 154 visits, ages 7-18 yo
- Acupuncture decreased headache intensity (VAS) significantly (immediately after treatment)
  - Mean change = 2.07 ± 1.90 (t(23)=2.07, p<.05 (Cohen d = 1.09)

Esparham AE et al. J Child Neurol 2020

Acupuncture to Abort Migraines

- Prospective cohort study of 8-18 yrs in academic pediatric emergency department from June 2014 to May 2015
- Auricular Acupuncture – 19 patients w/ migraine
  - 2 withdrew from study
  - Mean pre-intervention VAS pain scale = 7.63
  - Mean post-intervention VAS pain scale = 0.55
  - Mean change in score = 7.03, p<.001

Graff DM, McDonald MJPEC 2016

Medical Acupuncture at Children’s Mercy

- 6 WEEKLY SESSIONS, THEN 2 BIMONTHLY, AND 2-3 MONTHLY
- CUMULATIVE EFFECT
- INDIVIDUALIZED TREATMENT PLAN, OFTEN DIFFERENT EACH WEEK
Basic Acupuncture Curriculum

- Easy to learn
- General pain/comfort treatment that can be applied more universally than other acupuncture protocols
- Eliminates need to learn TCM diagnosis and develop individualized treatment plans
- Greatly increases access & ability to study acupuncture in pain conditions
- 1st Pediatric Acupuncture Protocol Training Program

Battlefield Acupuncture (BFA)

- Battlefield Auricular Acupuncture (BFA)
- Developed by Dr. Richard Niemtzow, MD, PhD, MPH, retired Air Force Colonel
- Veterans Health Administration Trained over 2700 Clinicians

Needles Used
38 pediatricians completed (45 began the course)
- 6 withdrew due to unknown reasons
- 1 stopped mid-acupuncture and did not provide to patients
- 1 unable to complete procedure log
- 1 felt BFA uncomfortable and didn’t want to provide to patients
- 2 completed curriculum later date
- 9 subspecialties:
  - PEM, hospital, D&B, GI, sleep, rehab, neuro, hem/onc
- 10 hours of CME
- 10 ABP MOC Part 2 points
Evaluation/Feedback

- Knowledge Exam
  - Online pre-test and post-test (6 questions): 80% or higher to pass on post-test
- Attitudes
  - Pre and post-curriculum
  - "I believe acupuncture is a good treatment for pediatric patients in acute pain/chronic pain"
- Acupuncture Skills Exam
  - BFA and Four Gates Skills Practicum
- CME/Course Evaluation

Dilts JJ et al. Academ Ped. 2021
Acupuncture Acceptability in Pediatric Patients

- CMH ED – Patients in Waiting Room Were Surveyed
- 116 patients and 124 parents
- 88% very likely to try acupuncture
- Prior awareness of acupuncture increased likelihood of trying acupuncture
  - Presented at PCJS (person et al. 2021)
  - Similar to other studies by Kathi Kemper and Kristen Jastrowski Mano
- Parental experience with acupuncture plays a large role in their child’s consideration of acupuncture
- Pediatric patients with chronic pain found acupuncture pleasant and helpful

Basic Acupuncture Implementation in Academic Pediatric Emergency Dept

- Qualitative Interviews to Evaluate Feasibility of Basic Acupuncture Implementation
- ~20 pediatric emergency physicians credentialed in Basic Acupuncture
- 8 physicians participated in individual interviews

Multiple factors that Promote Acupuncture Use

- Education for patients, families, ED staff, and general community
- Promote standardized and equitable access to acupuncture
- All ED physicians should be credentialed in basic acupuncture
- ED acupuncture video for children and families
- ED acupuncture toolbox for physician acupuncturists
- More likely to offer acupuncture for patients who present with migraines/headaches and chronic pain
Basic Acupuncture Implementation in Academic Pediatric Emergency Dept

Multiple factors that Act As Barriers to Acupuncture Use
• Patient-Level barriers
  • Needle phobia
  • Perception that acupuncture is painful
• Parent-Level barriers
  • Lack of knowledge of acupuncture procedure
  • Time constraints (would acupuncture make them stay longer in ER?)
• Staff-Level barriers
  • ED staff not knowing acupuncture was available to patients
  • Time constraints for staff (did not have adequate time to discuss and perform acupuncture)
• System-Level barriers
  • Unpredictability of ED setting
  • Physician credentialing – not all ED physicians/providers credentialed
  • No standardized process of performing acupuncture in ED
  • Unreliably stocked acupuncture supplies

Case 1: History
• 15 yo female with chronic intractable migraine without aura (DAILY RELENTING HEAD PAIN!)
• Significant anxiety and stress as major triggers
• Trialed Magnesium, Riboflavin, CoQ10
• Not a candidate for amitriptyline/Topamax or propranolol

Case 1: Management
• Referred to acupuncture (weekly sessions for 6-8 weeks, then bimonthly and monthly for maintenance)
• After 4th session, decreased headaches from daily to 5 headaches per month
• Working on stress coping and resilience
• Therapy twice monthly
Next Steps in Acupuncture for Pediatric Migraine

- NIH Grant (Mind-Body Application) – Dr. Jen Dilts, PI
- Feasibility and Acceptability of Acupuncture Pilot Study
- Dr. Jackson’s grant on acupuncture and fractures vs. opioid and NSAID use
- Multi-Site Pediatric Trials

Questions?
Feel free to email me:
aeesparham@cmh.edu