Acupuncture for Headache

- Acupuncture theory and history
- Modern theory
- Acupuncture and headaches
- Acupuncture in practice
Acupuncture

• Thin needles are inserted into specific areas on the body (acupuncture points)
• Modulate the course of a disease
• Reduce objective and subjective findings

Acupuncture history

• Originated in China at least 3000 years ago
• Huang di Neijing (Yellow Emperor’s Classic of Internal Medicine)
• explaining pathogeneses, diagnostic and treatment modalities
• Different styles:
  • Traditional Chinese acupuncture
  • Japanese style acupuncture
  • Korean hand acupuncture
  • Auricular acupuncture

Acupuncture in the US

- Sir William Osler 1896
- President Nixon and the NY times 1970s
- FDA reclassifies needles 1996
- Surgical analgesia 1950s
- NIH grant 1972
1997 NIH consensus development panel

- Treatment
  - Adult postoperative and chemotherapy nausea and vomiting
  - Postoperative dental pain

- Adjunct treatment or alternative treatment
  - Addiction
  - Stroke rehabilitation
  - Headache
  - Menstrual cramps
  - Tennis elbow
  - Fibromyalgia
  - Myofascial pain
  - Osteoarthritis
  - Low back pain
  - Carpal tunnel syndrome
  - Asthma

ACUPUNCTURE THEORY

- Based on over two thousand years of critical thought and empirical observation
- Find a unifying pattern that defines the state of imbalance in the organism as a whole, and the relation to the environment
- Synthesize all the patient complaints, emotions, patterns of interactions with other people, dietary habits, and exam findings into an overall, integrated pattern of disharmony


Traditional Chinese Medicine Theory

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- Find a unifying pattern that defines the state of imbalance in the organism as a whole, and the relation to the environment
- Synthesize all the patient complaints, emotions, patterns of interactions with other people, dietary habits, and exam findings into an overall, integrated pattern of disharmony

Traditional Chinese Medicine Theory

• Treat the individual by focusing on why the patient cannot heal
• Tailored to the individual and not necessarily the “disease”
• Holistic
• Develop an understanding of the factors both internal and external that help identify the pattern of disharmony that encompasses the whole person and their life

Yin Yang Theory

• Polar opposites
  • Underlies all interactions in universe
  • No entity can exist in isolation of a relationship to everything else
• Yin and Yang oppose each other yet have an inter-dependent relationship
• Ideal = perfect balance
• Disruption of the balance causes disease or pain
  • If not corrected, Yin will separate from Yang and death occurs

Yin Yang Theory

Yang Qualities
  • Heat
  • Light/brightness
  • Activity
  • Moving outward and upward
  • Hyperfunction
  • “sympathetic”

Yin Qualities
  • Coldness
  • Darkness
  • Stilness
  • Moving inward and downward
  • Hypofunction
  • “parasympathetic”
Qi

- Energy force in the body
- Allows for movement, growth, warmth, and development in the body
- In good health, qi flows freely through the meridian system. An obstruction in the flow of qi can lead to a manifestation of disease and pain.
- Acupuncture points are used to bring the body back into a state of equilibrium by balancing the flow of qi in the meridian system and through the organs.

Five Phases (Element) theory


Meridians

- Virtual lines along the body’s surface on which acupuncture points are found


Acupuncture and placebo effect

- "...acupuncture theory becomes an issue of faith, which has no place in science"
- "The argument that acupuncture is more "holistic" or patient centered...is an insult to good physicians everywhere who are always empathetic and patient centered"
- Placebo responses to procedures are larger than those from oral medications
  - "The greater the invasive procedure, the greater the placebo effect"
- "Magical thinking (one believes science is not the only explanatory narrative of the world)"
- "Quackademic medicine"
- "Prescientific gobbledygook"

Solomon. Headache. 2017 Jan;57(1):143-146

Acupuncture and placebo effect

- Provider–patient relationship
- Expectation
- Ritual and mystique of needling
  - Complex interactions have a higher placebo effect than simple treatments
  - Many pills or needles have greater effect than a single pill or needle
- "Acupuncture as therapy has persisted into the modern era not because of ancient mythological concepts but because it works. And it works by evoking the potent physiological changes of the placebo effect."

Acupuncture analgesia

- CSF cross-infusion study in rabbits
  - Chemical mediation of acupuncture analgesia
- Opioid receptor antagonism can abolish the analgesia obtained with acupuncture in both human and animal models of acute pain
  - Naloxone studies in mice and humans

Acupuncture analgesia

<table>
<thead>
<tr>
<th>OPIOID RECEPTORS</th>
<th>ENDOGENOUS AGONIST</th>
<th>ANTAGONIST</th>
</tr>
</thead>
<tbody>
<tr>
<td>µ (mu)</td>
<td>β-endorphins</td>
<td>Naloxone</td>
</tr>
<tr>
<td>δ (delta)</td>
<td>Met-enkephalin</td>
<td>Naloxone</td>
</tr>
<tr>
<td>κ (kappa)</td>
<td>Dynorphin</td>
<td>Naloxone</td>
</tr>
</tbody>
</table>
Opioid mechanisms of EA-induced analgesia

- Neuropeptides released in CNS
- Opioid receptors
- Physiological and therapeutic effects

Acupoints
- Located near peripheral nerves and bifurcations, neuromuscular attachments, blood vessels, ligaments, and suture lines of the skull
- Branches of the trigeminal nerve and facial nerve
- Histological: dermis and subcutaneous tissue, then deeper fascia or interstitial connective tissue
- Non-acupoints: dermis, subcutaneous tissue, and reach the muscle and bone, less likely passing through or inserting into the deep fascia layer
- “winding around the needle”

Acupuncture analgesia
- Hypothalamic-Pituitary Axis influences the analgesic response to pain
- Trigeminal Nucleus Caudalis
- Brain areas
  - Periaqueductal gray, Nucleus accumbens, Amygdala, Nucleus caudatus, raphe nucleus
fMRI study

- Thirteen normal subjects
- Acupuncture stimulation at Large Intestine 4 to produce deqi

fMRI study conclusions

- Unilateral acupuncture showed bilateral neural modulation of cortical and subcortical structures, causing a signal decrease in the limbic region and other subcortical areas.
- Tactile stimulation did not produce these changes on fMRI.
- Acupuncture modulates the conscious experience of pain.

HEADACHE AND ACUPUNCTURE

Cluster Headache Diagnostic Criteria

A. At least five attacks fulfilling criteria B-D.
B. Severe or very severe unilateral orbital, supraorbital and/or temporal pain lasting 15-180 minutes (when untreated).
C. Either or both of the following:
   1. at least one of the following symptoms or signs, ipsilateral to the headache:
      - conjunctival injection and/or lacrimation
      - nasal congestion and/or rhinorrhea
      - eyelid oedema
      - forehead and facial sweating
      - miosis and/or ptosis
   2. a sense of restlessness or agitation
D. Occurring with a frequency between one every other day and 8 per day.
E. Not better accounted for by another ICHD-3 diagnosis.

Acupuncture in cluster headache

- “Liver fire”
- Severe headache with “burning, throbbing, distending or penetrating” pain located in the oculo-temporal region, conjunctival injection, nausea, vomiting, runny nose, tearing, agitation, sensation of heat and sweating of the face

- Four patients
  - Acupuncture as prevention
  - Acupuncture + Verapamil
- All patients received the same protocol
- Twice/week for 2 weeks, then once/week for 8 weeks, and then once/alternate weeks for 2 weeks.


Patient 1

- 39 year old male with episodic CH for 20 years
  - July-August or November-December; cluster occurred every 2 years (2-3 attacks/week) then in 2008 became yearly, lasting 15-20 minutes
  - Right orbital-supraorbital region associated with photophobia, phonophobia, agitation, restlessness, and autonomic signs (pallor, conjunctival injection, miosis, forehead and facial sweating and flushing)
  - Verapamil 360 mg/day effective for 3 years except for current cycle (4 attacks/week)

- Treatment response:
  - Treatment #3: reduction of the number of attacks was observed
  - Treatment #6: verapamil dose reduced to 240 mg/day
  - Treatment #9: verapamil dose to 120 mg/day and stopped completely after the tenth treatment
  - Remission was maintained with one acupuncture/week for another 4 weeks. A new cluster started after 45 days from the last treatment, so that acupuncture alone with the same protocol was promptly initiated with immediate benefit.
Patient 2

- 23-year-old male with chronic CH for 5 years
- 1–4 attacks/day, lasting 120 minutes
- Left orbital and fronto-temporal areas with ipsilateral tearing, conjunctival injection, palpebral edema, agitation and irritability
- Responded to sumatriptan s.c. (not oxygen mask therapy). Verapamil 600 mg/day reduced attacks (one every other day). No response to prednisone or lithium
- Treatment response:
  - Acupuncture and verapamil (360 mg/day) led to a frequency of 1–4 attacks/month.
  - Remission was maintained for 2 months after the end of the acupuncture treatment. Cluster headache attacks then returned with a frequency of one attack daily. Reintroducing acupuncture reduced frequency to one attack/week.

Patient 3

- 38-year-old male with episodic CH for 18 years
- March–June; 2–7 attacks/day lasting 20 minutes
- Left tempo-parietal, frontal, orbital, rarely on upper dental arch associated with rhinorrhea, tearing, conjunctival injection and palpebral edema.
- Responded to sumatriptan s.c. Verapamil (360 mg/day) reduced frequency to 1/day in 2 weeks and to stop the cluster.
- Treatment response:
  - Verapamil and acupuncture was prescribed and a complete remission was obtained
  - The following year, acupuncture alone at the start of cycle led to remission after 2 weeks

Patient 4

- 43-year-old female with episodic CH for 18 years
- Annual cycles, January–March, 1–2 attacks/day, lasting 60–120 minutes
- Right occular region to the nose and to ipsilateral side of the head associated with photophobia, body sweating, rhinorrhea, ipsilateral tearing, nasal congestion and irritability
- Responded to sumatriptan s.c., but not oxygen therapy. Methysergide caused adverse effects. Verapamil 360 mg/day for 20 days was effective in interrupting the cluster but the patient did not tolerate the drug.
- Treatment response:
  - Acupuncture and verapamil 240 mg/day was started. After 2 weeks verapamil was reduced to 120 mg/day because attacks decreased to 1 every 3 days. CH remission was obtained after 20 days of acupuncture and verapamil was discontinued.
  - Acupuncture plus verapamil 120 mg/day for six CH periods, after that, acupuncture alone was administered when necessary for the following 3 years
Acupuncture in cluster headache

• Conclusions
  • Acupuncture may be an option for treatment of cluster headache with or without verapamil

• Limitations
  • Did not define the average length of each cluster cycle for each patient
  • Acupuncture treatments were over 12 week period
  • Typical cluster cycle on average last 8 weeks

Limitations
- Did not define the average length of each cluster cycle for each patient
- Acupuncture treatments were over 12 week period
- Typical cluster cycle on average last 8 weeks

Tension-type Headache Diagnostic Criteria

A. At least 10 episodes of headache fulfilling criteria B-D
B. Lasting from 30 minutes to 7 days
C. At least two of the following four characteristics:
   1. bilateral location
   2. pressing or tightening (non-pulsating) quality
   3. mild or moderate intensity
   4. not aggravated by routine physical activity such as walking or climbing stairs
D. Both of the following:
   1. no nausea or vomiting
   2. no more than one of photophobia or phonophobia
E. Not better accounted for by another ICHD-3 diagnosis

Acupuncture for the prevention of tension-type headache – Cochrane review 2016

• Twelve trials with 2349 participants

• Primary outcome:
  • Response (at least 50% reduction of headache frequency) after completion of treatment (three to four months after randomization)

• Secondary outcomes:
  • Response at other time points
  • Number of headache days
  • Headache intensity
  • Frequency of analgesic use
  • Headache scores
Acupuncture for the prevention of tension-type headache

- Control interventions
- Treatment of acute headaches or routine care (2 trials)
- Sham interventions (7 trials)
- Other active treatments (pharmacological, cognitive and physical treatment) (4 trials)

- Excluded trials comparing acupuncture to food supplements, herbal drugs or combinations of herbal drugs
- No trials comparing acupuncture to prophylactic drug treatment

Acupuncture for the prevention of tension-type headache – Results

<table>
<thead>
<tr>
<th></th>
<th>Acupuncture</th>
<th>Routine care</th>
<th>Acupuncture</th>
<th>Sham</th>
<th>Acupuncture</th>
<th>Other treatments</th>
</tr>
</thead>
<tbody>
<tr>
<td>50% reduction in headache frequency</td>
<td>49%*</td>
<td>43%</td>
<td>51%*</td>
<td>43%</td>
<td>52%*</td>
<td>43%</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>No change</td>
</tr>
</tbody>
</table>

Primary Outcome - Response

- [Graph or table showing the results]
Acupuncture for the prevention of tension-type headache - Conclusions

- Largely unchanged from 2009
- Adding acupuncture to routine care or treatment of acute headache reduces the frequency of headaches over three months
- Small but significant reduction of headache frequency over sham over six months
- None of the four trials found superiority of acupuncture to other treatments
- Acupuncture may be considered for treating frequent episodic or chronic tension-type headaches

Migraine Diagnostic Criteria

A. At least five attacks fulfilling criteria B–D
B. Headache attacks lasting 4–72 hours (untreated or unsuccessfully treated)
C. Headache has at least two of the following four characteristics:
   1. unilateral location
   2. pulsating quality
   3. moderate or severe pain intensity
   4. aggravation by or causing avoidance of routine physical activity (e.g. walking or climbing stairs)
D. During headache at least one of the following:
   1. nausea and/or vomiting
   2. photophobia and phonophobia
E. Not better accounted for by another ICHD-3 diagnosis.

Acupuncture for the prevention of episodic migraine – Cochrane review 2016

- Twenty-two trials with 4985 participants

Primary outcome
- Headache frequency at treatment completion (2 months) and follow-up (3 and 6 months)
  - Migraine days, attacks or headache days

Secondary outcome
- Proportion of responders at completion of treatment and follow-up
  - 50% reduction of migraine frequency compared to baseline
Acupuncture for the prevention of episodic migraine

- Acupuncture interventions
  - Five trials – standardized
  - Seven trials – semi-standardized
  - Ten trials – individualized

- Control interventions
  - No acupuncture (acute treatment or routine care)
  - Sham intervention
  - Prophylactic drug treatment
    - Flunarizine, metoprolol, valproic acid

Acupuncture for the prevention of episodic migraine - Results

<table>
<thead>
<tr>
<th>Treatment</th>
<th>50% reduction in headache frequency</th>
<th>50% response</th>
<th>Prophylactic treatments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acupuncture</td>
<td>41%*</td>
<td>41%</td>
<td>57% (3 mo) 59% (6 mo)</td>
</tr>
<tr>
<td>Routine care</td>
<td>17%</td>
<td>57%</td>
<td>54%</td>
</tr>
<tr>
<td>Acupuncture</td>
<td>50%*</td>
<td></td>
<td>54%</td>
</tr>
<tr>
<td>Sham</td>
<td>41%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Acupuncture vs no acupuncture

- Headache frequency
- 50% response
Acupuncture vs sham

**HEADACHE FREQUENCY**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
<th>Week 5</th>
<th>Week 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acupuncture</td>
<td>10</td>
<td>8</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Sham</td>
<td>12</td>
<td>10</td>
<td>8</td>
<td>6</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

**50% RESPONSE**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>50% Response Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acupuncture</td>
<td>70%</td>
</tr>
<tr>
<td>Sham</td>
<td>50%</td>
</tr>
</tbody>
</table>

Acupuncture vs prophylaxis

**HEADACHE FREQUENCY**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
<th>Week 5</th>
<th>Week 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acupuncture</td>
<td>10</td>
<td>8</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Prophylaxis</td>
<td>15</td>
<td>12</td>
<td>10</td>
<td>8</td>
<td>6</td>
<td>4</td>
</tr>
</tbody>
</table>

**50% RESPONSE**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>50% Response Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acupuncture</td>
<td>70%</td>
</tr>
<tr>
<td>Prophylaxis</td>
<td>60%</td>
</tr>
</tbody>
</table>

Acupuncture for the prevention of episodic migraine - Conclusions

- Acupuncture seems to be effective for migraine prophylaxis
- Slightly more effective than sham acupuncture*
- May be similarly effective as prophylactic drug treatment
- Acupuncture can be considered a treatment option for people with migraine needing prophylactic treatment
Acupuncture and botulinumtoxinA in the treatment of chronic migraine

- Randomized controlled trial
- 150 patients
- Acupuncture
- botulinumtoxinA
- Control group (sodium valproate 500 mg/day for three months)
- Northern Iran

Outcomes
- VAS score
- Number of days per month of migraine
- Absence of work
- Need for acute medication
Outcomes

Missed days

Acute treatment
Acupuncture and botulinum toxin A

- Conclusions
  - Severity (VAS)
  - Migraine days per month
  - Missed days
  - Use of medication

- Limitations
  - Short observation time, small size and the number of treatment sessions
  - Cumulative effect of Botox at 3-6 months

Long-term Effect of Acupuncture for Migraine Prophylaxis

- Randomized clinical trial
- 24 weeks – 4 weeks of treatment followed by 20 weeks of follow-up
- 249 participants (migraine 2-8 times a month)
  - True acupuncture (electroacupuncture) (TA)
  - Sham acupuncture (SA)
  - Waiting list control (WL)
- Treatment groups received 5 days per week for 4 weeks
- Wait-list group received 20 free sessions of acupuncture at end of trial


Acupuncture points

- Four acupoints per treatment
  - GB20 and GB34, SI1, BL10, SI3, SI4, LI4, ST44, LR3, and GB40
- Achieve the Deqi sensation
- Stimulation frequency was 2/100 Hz (alternating every 3 seconds), and the intensity varied from 0.3 to 1.0 mA until the patients felt comfortable
- Sham acupuncture – non acupuncture and no Deqi sensation
Outcomes

- Primary outcome: change in frequency of migraine attacks from baseline to week 16
- Secondary outcome (over 24 weeks)
  - Migraine days
  - Average headache severity
  - Acute medication intake (ibuprofen 300 mg)

Results

- Primary outcome (frequency of attacks)

Results – Secondary outcomes
**Long-term Effect of Acupuncture for Migraine Prophylaxis**

**Conclusions**
- True acupuncture reduced migraine frequency, number of days with migraine, and pain intensity to a greater degree than SA or WL.
- SA may reduce migraine frequency and number of days with migraine within 8 weeks after treatment rather than at the end of the treatment session.

**Limitations**
- Semistandard treatment with fewer acupoints stimulated.
- Blinding was not possible for patients in the WL group.
- Did not test the acupuncture vs and standard therapy on migraine prophylaxis.

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**ACUPUNCTURE IN PRACTICE**

**Acupuncture treatments - considerations**
- Cost of acupuncture
- Time
- Side effects to medications
- Pregnancy
- Contraindications:
  - Skin and soft tissue infections
  - Bleeding disorders
  - Patients on anticoagulants
Acupuncture – what patients can expect

• Quiet, dark room
• Gown, blankets, pillows, face cushion
• Soothing music
• Promote relaxation
• Front and back treatments
  • 10-25 needles for 15-20 minutes
• Hydration afterwards

Acupuncture risks and benefits

• Infection, bleeding, bruising, no change in pain, increase in pain, nerve injury, pneumothorax, depression, euphoria, or lack of therapeutic benefit
• May need at least six to eight sessions to see improvement in headache

Acupuncture treatment

Japanese style (palpation based)

• History
  • Birth history, childhood illnesses
• Hara diagnosis
  • Palpation of abdomen
  • Reflects general health
• Additional treatment points
  • Depression points (mood and holocephalic)
  • Vertebral artery treatments (for neck tension)
Patients report

- Decreased frequency
- Decreased severity
- Less acute medication needed
- Better response to acute medication
- Improvement in overall health
- Stress reduction

CASE PRESENTATION

Patient L.E.

- 54 yo F h/o SLE, RA, IBS and chronic migraine with and without aura
  - Migraines started at age 6 and became chronic at age 12 (daily)
  - Migraines improved with onabotulinumtoxinA in 2009 (8d/month)
  - Acupuncture treatment started in January 2015 for migraines and chronic pain from SLE and RA – total of 19 sessions
Patient L.E. treatment outcomes

- Migraines continued to reduce in frequency (2-3d/month)
- Improvement in bowel movements after first session
- Milder migraines with weather changes after third session
- No migraines during “wearing off” of onabotulinumtoxinA after fourth session
- She could eat ice cream again!

So...should we recommend acupuncture as a treatment option?

YES!

THANK YOU!
Questions: adelene.jann@nyumc.org