ROLE OF STEROIDS IN ACUTE PHONOTRAUMA: A BASIC SCIENCE INVESTIGATION

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BACKGROUND

- Vocal fold inflammation is not uncommon in the setting of phonotrauma +/- inflammatory events
- Vocal rest is intuitive and logical on the surface
  - may be insufficient to stem an inflammatory response once it has begun
  - for acute phonotrauma, may supplement with pharmaceutical intervention in the form of systemic steroids
- Steroids are a common course of treatment for vocal fold inflammation

BACKGROUND

- Vocal loading results in sharp increases in inflammatory marker values (Verdolini, Rosen, Branski, Hebda, 2003)
- Secretions collected from site of injury reflect local inflammatory tissue processes (Branski, Hebda, Hake, et al., 2005)
- Acute vocal fold inflammation may be minimized by vocal exercise (Verdolini Abbott et al., in submission)

BACKGROUND

- Effect of steroids in the body
  - Inhibit expression of pro-inflammatory cytokines (IL-1, IL-6, TNF) (Campagnolo et al., 2008)
  - Enhance anti-inflammatory cytokine IL-10 in respiratory epithelium (John et al., 1998)
  - In humans with post-operative iatrogenic fibrosis, local steroid injection improved voice quality, vocal fold vibratory amplitude, mucosal wave (Mortenson & Woo, 2006)
- Markers of interest
  - IL-1β pro-inflammatory
  - IL-6 pro-inflammatory
  - IL-10 anti-inflammatory
RESEARCH QUESTION

• Do steroids optimize improvement in the individual biomarkers 4 hours after treatment initiation and 23 hours after baseline?

METHODS

• Double-blind, randomized, prospective

• Participants
  — 10 women, 20 - 31 years old (M = 24 years)
  — Screened for nasal patency, normal larynx
  — None were within 7 days of onset of menses
  — Negative history of:
    • Voice or hearing problem
    • Smoking
    • Current pregnancy
    • Allergy to anesthesia or steroids
    • Hypertension, diabetes, cardiac or ulcerative disease

EXPERIMENTAL DETAILS

• Secretion sample #1
• Vocal loading
• Secretion sample #2
• Rest for 5 hours
  — Pill #1 (100 mg oral hydrocortisone or placebo) administered after first hour of rest
• Secretion sample #3, then subject released home on complete voice rest
• Pills #2 and #3 taken at 8 and 16 hours after first pill
• Secretion sample #4
  — 23 hours after baseline
  — 22 hours after vocal loading
  — 4 hours after last pill
SAMPLE ANALYSIS

• Markers of interest
  – IL-1β pro-inflammatory
  – IL-6 pro-inflammatory
  – IL-10 anti-inflammatory
• All secretion analyses carried out by an investigator blinded to conditions
• ELISA

PHONOTRAUMA “RESPONDERS”

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PRE-TO POST-LOAD INCREASE IN IL-1β

FINDINGS
**PRE-TO POST-LOAD INCREASE IN IL-6**

**PRE-TO POST-LOAD INCREASE IN IL-10**

**PRO-INFLAMMATORY RESPONSE**

**ANTI-INFLAMMATORY RESPONSE**
DISCUSSION

• Descriptively, patterns of response are as hypothesized
  – Pro-inflammatory cytokines IL-1β and IL-6 appear to be decreased by oral steroid treatment
  – Oral steroid treatment may acutely upregulate IL-10, an anti-inflammatory cytokine

REFERENCES


• Preliminary results support the continued use of oral corticosteroids for acute treatment of vocal fold inflammation
• Further investigation is warranted to examine the effects of steroids
  – In a larger cohort
  – Injection versus systemic steroid administration
  – Dose- and duration-varying conditions