Factor Impacting Treatment Decisions

- The degree to which the tremor is isolated to the larynx or affects other speech structures
- The severity of impaired intelligibility during conversation
- Responsiveness to therapy strategies during stimulability testing
- Motivation to pursue behavioral intervention
  - May desire Botox® treatment alone or combined with speech treatment
  - May respond well to systemic medications
- Ability to attend treatment sessions consistently

Voice Evaluation Tasks of Interest

- Patient Self-Report on quality of life impact
- Auditory-Perceptual Evaluation
  - Sustained vowel using /a/ and /i/
  - Evaluate pitch and loudness changes to vocal tremor
  - Sustained phonation vs connected speech sentences varying voiceless and voiced phonemes
- Acoustic Measures of rate and extent of fo, SPL, and F1 and F2
- Laryngeal Imaging to observe structures

Roadmap of Talk

- Treatment Options for Vocal Tremor
  - Factors impacting treatment decisions
  - Voice evaluation findings of interest
- Vocal Tremor Speech Treatment Principles
  - Vocal tremor is action-induced
  - Voicing duration and vocal tremor
  - Speech structure contributions
  - Vocal Tremor Speech Treatment Summary
- Case Examples

Treatment Options for Vocal Tremor

- Pharmaceutical
  - Systemic
    - Propranolol, primidone, etc.
  - Local
    - Botox® to laryngeal muscles
- Surgical
  - Deep Brain Stimulation (DBS)
  - Thalamic ablative
- Voice therapy

I've always wanted to be a mover and a shaker!
Voice Evaluation Findings of Interest:

- Determine the speaking patterns that elicit greater or lesser vocal tremor magnitude
  1. Vocal tremor severity by speech context
  2. Ability of individual to shorten voicing duration
  3. Speech structures exhibiting oscillation
  4. Acoustic measures (rate and extent of fo, SPL, F1/F2, articulation rate)
  5. Changes in vocal tremor severity with pitch and loudness changes

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Vocal Tremor Speech Treatment Principles

- Vocal tremor is action-induced
  - Reducing upper airway volitional muscle contraction will lessen oscillation amplitude
- Voice duration determines vocal tremor perception
  - Voicing duration < 500 ms results in mild to no perception of vocal tremor
- The contribution of specific structures can influence strategies
  - Altered Pitch/loudness intonation patterns may reduce vocal tremor

Vocal Tremor is Action-Induced

- Action-Induced Tremor
  - Worsens with increased activation of affected muscles
  - Magnitude of tremor is inversely related to rate
    - Reflects severity or degree of muscle activation
- Common patient strategy for speaking with a predictable perturbation (i.e. tremor)
  - Slowed speaking rate with prolonged voicing durations
  - Reduced airflow due to increased throat strain

Methods that help restore phonatory-respiratory coordination

- Accent Method
- Confidential Voice
- Flow Phonation
- Easy Voice Onset

Vocal Tremor and speech strategies

“The solutions all are simple—after you have arrived at them. But they’re simple only when you know already what they are.”

-Robert M Pirsig

Simplicity is the ultimate sophistication.”

- Leonardo da Vinci

Go with the Flow - Early
Voicing Duration and Vocal Tremor

- Shorten duration of voicing during speaking
  - < 500 ms reduces perception of vocal tremor
- Begin with single syllable productions ("ha" "he")
- Progress to all-voiced words, phrases, sentences, paragraph reading, and conversation

Speech Structure Contributions

- Look for patterns of vocal tremor worsening/lessening with intonation
  - Worse during lower pitches/sentence endings
  - Worse during higher pitches/questions
- Insertion of pauses or phrase breaks

Treatment Summary

<table>
<thead>
<tr>
<th>THERAPY OBJECTIVE</th>
<th>METHODS</th>
<th>OUTCOME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase respiratory-phonatory coordination</td>
<td>Accent Method, Flow phonation, Confidential Voicing, Easy voice onset, Yawn-sigh, Resonant Voicing</td>
<td>Reduce upper airway muscle tension and tremor amplitude</td>
</tr>
<tr>
<td>Shorten Voicing Duration (&lt; 500 ms)</td>
<td>1) Easy voice onset using &quot;h&quot; words and build toward all words typically spoken; 2) Practice-volitional shortened voicing duration using phrase context (e.g. voiceless-loaded speech sounds and then voice-loaded speech sounds); 3) Shape toward sentences, reading paragraphs, conversation</td>
<td>Reduce the frequency of detecting vocal tremor during conversation due to reduced voicing duration ≤ 500 ms</td>
</tr>
<tr>
<td>Link specific speech structures exhibiting tremor to contexts that worsen and lessen vocal tremor</td>
<td>Tweak intonation patterns, encourage shorter phrase length, insert pauses for air replenishment, reduce, or increase speaking rate as deemed beneficial</td>
<td>Further modify individual speaking patterns to lessen speaking patterns that increase vocal tremor amplitude</td>
</tr>
</tbody>
</table>

Vocal Tremor Treatment (thus far)

- Target population = Mild-moderate vocal tremor
- Critical therapy program elements include:
  - Respiratory-phonatory coordination
  - Shortened voicing duration
- Secondary therapy program elements include:
  - Insertion of pauses or phrase breaks
  - Increased breathiness
  - Modification of intonation patterns
- Typical therapy dosage to achieve goals
  - 6-8 sessions: 1 session/week
- Treatment outcome variables
  - Sustained phonation acoustic measures (fo, SPL, F1, F2)
  - % detection of vocal tremor within connected speech
  - Patient self-report questionnaires

Treatment Considerations...

- Severity of tremor, particularly over time
- Structures affected by tremor
- Individual speaking patterns that worsen or lessen the perception of tremor
- Motivation to pursue behavioral intervention
  - Strategies may not automatize
- Ability to attend treatment sessions consistently
- Adaptation with disease progression
- Consider as a supplement to Botox®

Roadmap of Talk

- Treatment Options for Vocal Tremor
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Case 1: Vocal Tremor Treatment Program

Case Example #2: Pre-treatment

- Sustained phonation of /a/
- “We rolled along Long Island Avenue”
- “We mow our lawn all year”

Case Example #2: Post-treatment

- Sustained phonation of /a/
- “We rolled along Long Island Avenue”
- “We mow our lawn all year”

Case Example #3

- Pre-treatment speech recording
- Post-treatment speech recording
Patterns

“You look at where you’re going and where you are and it never makes much sense, but then you look back at where you’ve been and a pattern seems to emerge. And if you project forward from that pattern, then sometimes you can come up with something.”

-Robert M. Pirsig

References


Vocal Tremor Treatment Summary

• Vocal tremor is a neurological voice problem
  – action-induced tremor affecting speech structures
• The voice evaluation should elucidate the
  – acoustic and
  – auditory-perceptual characteristics across speech tasks
• Observing or imaging affected structures during
  systematic testing of pitch and loudness can inform
  affected musculature
• Speech treatment offers strategies for reducing
  vocal tremor perception for those with mild to
  moderately severe vocal tremor
References