In patients with head and neck cancer, loss of swallowing function may result from radiation therapy, surgery, or the cancer itself and lead to poor health and reduced quality of life.

"A large body of evidence suggests that preventive swallowing therapy is the best practice for patients who are going to receive radiation therapy to the head and neck," Dr. Hutcheson said.

"We know that patients who keep their swallowing system engaged during the course of their radiation therapy have a better chance of recovering meaningful swallowing ability after their therapy. USE IT OR LOSE IT!

"Swallowing is a huge quality of life issue. The key to improving swallowing function is early and individualized therapy. A dysphagia-specialized speech pathologist—whether seen at MD Anderson or elsewhere—can help maximize a patient's outcome."

Disclosure

• Financial:
  – I receive a salary from Purdue University.
  – I occasionally provide prn services for IU Health Arnett Hospital for which I am compensated.
  – I will receive an honorarium for this presentation.
• Non-Financial:
  – None

Patient History

• 65 year old happily married musician
• Played trumpet professionally with numerous big bands and musicians
• Recorded CDs
• Provided private instruction

Patient History

• Diagnosed with right tonsillar cancer in 2001
• Underwent surgical resection and chemoradiation at University of Chicago Hospital
• At the time of treatment experienced significant mucositis and edema
• Used PEG tube for 7 months
• Participated in therapy
• VFSS → swallow sufficient. PEG removed.

Impact of Cancer Treatment

• Surgical
  – Sensory
  – Base of tongue involvement?
  – Palate involvement?
  – Lymph nodes?
  – Pharyngeal constrictor involvement?
Impact of Cancer Treatment

• Acute Radiation Changes
  – Xerostomia
  – Edema
  – Mucositis

• Progressive Radiation Changes
  – Decreased salivary flow
  – Taste reduction
  – Muscle change
    • Fibrosis
    • Sclerosis
    • Muscle edema
    • Atrophy/Disuse

First Presented To Us

• Increasing symptoms of dysphagia 2010
• VFSS revealed moderate-severe dysphagia with reduced tongue base retraction, epiglottic inversion, laryngeal elevation/anterior hyoid movement, and vestibular closure, and decreased sensation.
• Aspiration of liquids and puree
• Significant pharyngeal residue
• Outcome: Wished to continue to eat unrestricted diet.
• Continued therapy in his hometown

Initial Complications 2013

• Hospitalized with pneumonia in December 2013
  – Repeat VFSS- Similar findings
  – Aspiration of thin liquids. Severe pharyngeal residue.
  – Patient’s wishes: Continue to eat unrestricted diet
  – Strategies: Limit bolus size, cough re-swallow, right head turn
  – Swallowing therapy as an inpatient
VIDEO

Swallowing Strategies
- Super supraglottic swallow
- Modified Mendelsohn
- Second swallow
- Purposeful cough
- Safe sip and bite size

Rehabilitative Exercises
- Gargle/Tongue Pull Back
- Masako
- Mendelsohn
- Super Supraglottic Swallow
- Effortful Swallow
- Shaker
- Chin Tuck Against Resistance

Treatment
(Adapted from Burkhead, ASHA, 2013)

Direct exercise
- Mendelsohn
- Effortful swallow
- Tongue hold swallow
  (Masako)
- Skill specific

Indirect exercise
- Shaker
- EMST
- Lingual strengthening
- Strength training
Mendelsohn Maneuver

• Can be used as strengthening/ROM or as a maneuver
• Load= holding larynx in elevated position against resistance
• Using with bolus may increase salience, load
• Increased activation of submental muscles
• Increased vertical-anterior duration & extent of hyoid & laryngeal movement
• Increased A-P diameter and duration of UES opening
• Improved coordination
• Improved timing
• Increased pressure/BOT-PPW

Effortful Swallow

• Impacts submental muscle activation
• *May* consequently affect airway protection and UES activation ➔ earlier onset/longer duration /extent motion
• Increased generation of oral pressure-dependent upon instruction
• Increased pharyngeal pressure BOT/PPW with longer duration and UES relaxation
• Potential for increase load/resistance by increasing bolus viscosity
• Task-oriented form of skill training with a strength component from greater muscular activation

Masako/Tongue Hold

• Designed to improve swallow physiology in individuals demonstrating decreased bolus clearance in upper pharynx due to decreased tongue base retraction or upper pharyngeal constrictor anterior ward motion
• Created in response to observation of increased anterior bulging of posterior pharyngeal wall after oral resection-passive load
• Conflicting findings: ↑ pharyngeal pressure – H/N ↓ pharyngeal pressures - nls

Shaker

• Incorporates passive resistance
• Isometric and isokinetic contractions
• Strap muscles of the neck and suprathyroid musculature
• Increased laryngeal anterior excursion and cross-sectional opening of the UES
• Improved swallowing function noted with decreased post-swallow aspiration
Chin Tuck Against Resistance
(Yoon et al.)
- Used for patients with dysphagia due to upper esophageal sphincter dysfunction
- Participants found the sitting position of CTAR to be less strenuous
- Greater maximum sEMG values were noted during the CTAR isokinetic and isometric exercises than during the equivalent Shaker exercises
- CTAR isometric exercise showed significantly greater sEMG values than the Shaker isometric exercise.
- Additional research needed

Increasing Difficulty
- Within next year two bouts of pneumonia for which he was not hospitalized
- Hospitalized with PNA for 16 days in December 2014.
- PEG tube placed through IR
- NPO
- Tried both Jevity and Ensure. Adverse side effects and 20-lb weight loss.
- Real Food Blends (tube feeding product) plus fortified protein mixtures stabilized weight.

Another VFSS
- Presented for a repeat video swallow study with goal of removing tube
- Severe pharyngeal dysphagia with reduced tongue base retraction, anterior hyoid movement, and pharyngeal stripping, absent epiglottic inversion, and limited cricopharyngeal opening

Referral to Laryngology 3/15
- Quite indurated soft tissues of the neck on exam with suggestion of velopharyngeal escape on phonation
- Pharyngeal, laryngeal, and cricopharyngeal findings on MBSS
- What can the surgeon add in this case to augment therapy?
- What is the risk/benefit profile?
Improving Pharyngo-Esophageal Bolus Movement – When Glottally Competent

- Velopharyngeal Closure
- Laryngeal Elevation & Protraction
- Cricopharyngeal Opening

Must Balance Risks with Chances of Improvement
Less Morbid/Minimally Invasive Procedures?

Addressing Deficits Procedurally

- Due to findings of poor cricopharyngeal opening and subjective VPI, discussion of an intervention was made
  - Cervical esophageal balloon dilation
  - Botulinum toxin injection into cricopharyngeus to allow for several months of muscular weakness
  - Posterior pharyngeal wall injection augmentation to improve VP closure – Resorbable gel

Post-Surgical Course-Swallowing

- Noted less resistance to swallowing following his procedure
- Referred back to speech pathology immediately to continue therapy
- VFSS results similar
- Considering additional treatments
  - I EaT Clinic
  - Swallow Strong
- Oral Care:
  - 2x/day prescription fluoride toothpaste
  - Brush
  - Floss
  - Fluoride treatments
  - Coconut oil: pulling

- Advanced from thin liquids to soft solids
- Originally incorporated SSG
- Gradually increased to 1-2 meals per day
- No longer needed O₂ when walking
- Questionable episode of URI/PNA
- Treated/released in ED
- He was happy with his swallowing
Post-Surgical Course-VPI with Trumpet Playing

- Had worsening of his velopharyngeal insufficiency
  - Unable to perform his high-level trumpet playing (holding notes for 5-7 seconds only)
- Visually appeared to close the velopharynx
- Importance of using temporary injections for such purposes
  - Gel lasts 2-3 months typically, resorbed late for patient
- Offered repeat injection or referral for dental appliance to close VP
- Opted for dental referral
- Prosthesis created that closed VP, but uncomfortable with playing
  - Essentially no helpful literature on this topic
- Chose not to pursue further treatment.

Continuous Positive Airway Pressure

- Limited research evaluating efficacy of treating VPD in individuals with cleft palate and TBI
- Premise: delivery of air pressure via nasal passages provides resistance to soft palate and pharyngeal wall muscles while patient produces specific sound combinations

Prosthetic Management

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CPAP Protocol

(Kuehn 1991)

- Incremental changes in the amount of time and pressure over eight-weeks/six days per week at-home
- Gradual increase in treatment time from 10 to 24 minutes.
- Pressure increases from 4 to 8.5 cm H₂O throughout the program.
- Utterances in the form of a VNCV sequence (v=vowel, n=nasal, c= “pressure” consonant) are produced with emphatic stress on the second syllable. Followed by sentences.
**CPAP Outcomes**

- Perceptual and instrumental gains in reduction of hypernasality inconsistently noted across patients and studies
- No clear evidence of maintenance effects
- Limitations
  - Small sample sizes
  - Ideal candidate unclear
  - Ideal protocol unknown
  - Intensive
  - Associated costs

**Expiratory Muscle Strength Training**

- Exhaling into a device with a one-way, spring-loaded pressure release valve
- Threshold to set release of the valve set at 60%-80% of max expiratory pressure
- Allows progressive quantifiable increase in resistance
- Transference –training neural substrates and muscles common to respiration and swallowing
- Potential effect on supraphyoid muscle recruitment, expiratory driving pressures for cough, vocal loudness

**Expiratory Muscle Strength Training**

- Sapienza (ASHA 2015) reported case of improved stress VPI in woodwind player

- Our question: Does EMST provide greater resistance than that achieved when actually playing the trumpet?

- To be continued.....................

**We must not forget that a quality life is a life full of meaning and purpose.**

We must consider a broad range of life domains, and individual values when treating this patient population.
Swallowing problems related to H&N cancer and its treatment can be devastating.

Historically we have tried to effect change in function after completion of CRT and fibrotic changes to muscle.

We are rethinking this with prophylactic exercise. The evidence regarding treatment type, frequency, and duration is not clear.

But we are gaining on it...........

References


References

Evidence Review for Dysphagia Rehabilitative Therapy in Patients with Head and Neck Cancer
Jaime Bauer Malandraki, MS, CCC-SLP
Clinical Instructor / Purdue University
Clinical Director / Purdue I-EaT Swallowing Research Clinic

Outline
- Evidence Review
  - Types and levels of research evidence
- Chronological review of recent research
  - First: General dysphagia tx in HNC
  - Second: Prophylactic dysphagia tx in HNC
- Conclusions

Disclosures
- Disclosures for Jaime Bauer Malandraki
  - Salary: Purdue University
  - No other relevant disclosures

EBP
- True evidence-based practice comes from the synergistic relationship of three types of evidence
Levels of Research Evidence

<table>
<thead>
<tr>
<th>Level</th>
<th>Type of evidence</th>
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<tbody>
<tr>
<td>LA</td>
<td>Systematic review (high homogeneity) of RCTs</td>
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<tr>
<td>LB</td>
<td>Individual RCT (high narrow confidence intervals)</td>
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<tr>
<td>LC</td>
<td>All or none study</td>
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<tr>
<td>LA</td>
<td>Systematic review (with homogeneity) of cohort studies</td>
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<tr>
<td>LB</td>
<td>Individual Cohort study (excluding low quality RCT, e.g. &lt;80% follow-up)</td>
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<tr>
<td>LC</td>
<td>&quot;Outcomes&quot; research; Ecological studies</td>
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<tr>
<td>LA</td>
<td>Systematic review (with homogeneity) of case-control studies</td>
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<tr>
<td>LB</td>
<td>Individual Case-control study</td>
</tr>
<tr>
<td>LC</td>
<td>Case series and low quality cohort and case-control study</td>
</tr>
<tr>
<td>LA</td>
<td>Expert opinion with explicit critical appraisal or based on physiology bench research or &quot;first principles&quot;</td>
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From the Centre for Evidence-Based Medicine, http://www.cebmr.net

(Burns et al. 2012)

Rehabilitative Intervention in HNC

• Most Common Outcome Variables (Goals) Assessed
  – Airway invasion (PA Scale)
  – Residue scales
  – Xerostomia assessments
  – Diet level and type (NOMS, FOIS, or similar scale)
  – QOL (MDADI, HNCI)

Types of Interventions

– Compensatory (postures and diet modification)
– Strengthening exercises (tongue strengthening, effortful swallow)
– ROM [with strengthening components] (head raise, Mendelsohn, Masako, supraglottic swallow, Therabite, pitch elevation)
– Electrical stimulation
– Dilatation or surgical interventions

Kraaijenga et al. 2014

Treatment post CRT and surgery

Highest Level of Evidence

• Lazarus et al. 2014 “Effects of Exercise on Swallowing and Tongue Strength in Patients with Oral and Oropharyngeal Cancer Treated with Primary Radiotherapy with or without Chemotherapy”
  – RCT
  – Outcome variables: tongue strength, VFSS variables (OPSE), QOL (HNCI), xerostomia assessment
  – Patients: Stage II-IV oral or oropharyngeal cancer, no hx of c-spine surg.
  – One month post-CRT randomized in 1 of 2 groups
    1. Treatment: 6 weeks of traditional therapy plus lingual strengthening (tongue depressors) [Treatment]
    2. 6 weeks of traditional therapy (ROM exercises & Mendelsohn) [Control]
  – Results:
    • 23 pts; 12 → Tx arm; 11 → control group [16 ended up doing the study]
    • Compliance: Tx group: only 3 subjects fair to good compliance
    • No significant differences in tongue strength, OPSE, salivary flow, minimal improvements in QOL
**Treatment post CRT and surgery**

**Highest Level of Evidence**

- **Logemann et al. 2009** “A Randomized Study Comparing the Shaker Exercise with Traditional Therapy: A Preliminary Study”
  - Outcome variables: Aspiration, residue, diet level (PSSD), hyolaryngeal biomechanics,
  - Patients: HNC and stroke (with at least 3 months history of severe dysphagia with reduced UES opening)
  - 1 of 2 groups
    1. 6 weeks of Shaker with 2 visits/week [treatment]
    2. 6 weeks of a series of exercises (super-supraglottic swallow, Mendelsohn, tongue retraction) 5 min 10x / day [control]
  - **Results:**
    - 14 pts; 5 → Tx arm; 9 → control group
    - Improvements in: aspiration (3/5 of tx group and 0/9 in control group);
      hyolaryngeal biomechanics (both groups)
    - No improvements in residue

- **Langmore et al. 2015** “Efficacy of Electrical Stimulation and Exercise for Dysphagia in Patients with Head and Neck Cancer: A Randomized Clinical Trial”
  - Outcome variables: PAS, OPSE, hyoid excursion, diet level (PSS), QOL (HNCI)
  - Patients: HNC 3 months post CRT/RT with moderate to severe dysphagia
  - 1 of 2 groups
    1. 12 weeks of E-stim with 3 exercises (super-supraglottic, Mendelsohn, effortful) [treatment]
    2. 12 weeks of sham E-stim with same exercises [control]
  - **Protocol:** 2x/day, 6 days/week
  - **Results:**
    - 170 pts; 116 → Tx arm; 54 → control group (although analysis included less)
    - PAS scores: improved in control group (but small effect size); no change in tx group
    - No other physiological improvements in either group
    - BUT: significant improvements in diet and QOL!
    - Compliance: ~50% for both groups

**Conclusions – in a nutshell**

- Treatment post CRT/RT for pts with chronic severe oropharyngeal dysphagia: **NOT effective in improving swallowing physiology**
- Improvements seen in QOL and diet level
- These results should be interpreted with caution
- Prophylactic exercises may be more promising

---

**Treatment DURING CRT/RT**

**Prophylactic exercises**

- **Van der Molen et al. 2011** “A Randomized Preventative Rehabilitation Trial in Advanced Head and Neck Cancer Patients Treated with Chemoradiotherapy: Feasibility, Compliance, and Short-Term Effects”
  - Outcome variables: PAS, residue, MIO (maximum interincisor mouth opening), BMI, FOIS, pain assessment
  - Patients: HNC with advanced (stages III and IV) SCC with CRT
  - 1 of 2 groups
    1. “Standard”: 10 weeks of standard exercises (ROM exercises, effortful, Masako and supraglottic) [Control]
    2. “Experimental Preventative” 10 weeks of ROM with Therabite and strengthening with swallow with open mouth [Treatment]
  - **Protocol:** 3x/day (varied reps/durations depending on activity)
  - **Results:**
    - 55 pts; 27 → Tx arm; 28 → Control group (analysis done on 49 pts)
    - Short-term Clinical Effects, Overall:
      - Positive: Sig. less residue with liquids, puree, cookie
      - Negative: No sig diff in PAS or pain pre- and post-tx; sig decrease in MIO; sig weight loss; sig decrease in FOIS scores
    - Short-term Clinical Effects, Group Comparison:
      - Experimental group showed sig. less residue with cookie
      - No other sig. difference between groups
Treatment DURING CRT/RT
Prophylactic exercises

- **Carnaby-Mann et al. 2011** “Pharyngocise”: Randomized Controlled Trial of Preventative Exercises to Maintain Muscle Structure and Swallowing Function During Head-and-Neck Chemoradiotherapy
  - Outcome variables: muscle size (MRI); FOIS; MASA; several other physiological and diet outcomes
  - Patients: HNC with CRT/RT (no prior hx of dysphagia d/t cancer)
  - 1 of 3 groups
    1. Usual care (counseling and feeding precautions)
    2. Standardized sham therapy (buccal extension maneuver and diet modification)*
    3. Pharyngocise: falsetto, tongue press, hard swallow, Therabite*
  *Protocol: 10 reps in 4 10-min cycles → 45 min sessions

**Results:**
- 58 pts; 20 usual care; 18 sham; 20 Pharyngocise
- Moderate compliance (more in the sham group)
- More preservation in 3 muscles with Pharyngocise (although all declined)
- Better MASA scores and mouth opening for Pharyngocise
- NO difference in VFSS and FEES physiologic parameters or in weight

- **Kotz et al. 2012** “Prophylactic Swallowing Exercises in Patients with Head and Neck Cancer Undergoing Chemoradiation”
  - Outcome variables: PSS-H&N; FOIS assessed at baseline, post CRT and 3, 6, 9 and 12 months post CRT
  - Patients: newly dx HNC with CRT
  - 1 of 2 groups
    1. Standard care (Ax and tx AFTER CRT if dysphagia present) [Control]
    2. Tx group (5 exercises: effortful, 2 tongue retraction, super-supraglottic, Mendelsohn) [Treatment]
  *Protocol: 3 sets of 10 reps of each exercise daily

**Results:**
- 26 pts
- No significant difference in FOIS and PSS-H&N post CRT
- Better FOIS and PSS-H&N scores at 3 and 6 months post CRT
- BUT! No difference again at 9 and 12 months

- **Hutcheson et al. 2013** “Eat and Exercise During Radiotherapy or Chemoradiotherapy for Pharyngeal Cancers: Use It or Lose It”
  - Design: Retrospective observational study
  - Patients: 497 pts with RT or CRT for pharyngeal CA between 2002-2008
  - Independent outcome variables: PO status; adherence
  - Dependent outcome variables: last diet level post CRT/RT; length of G-tube dependence
  - All patients: prophylactic exercises (a total of 10 exercises) performed daily; some also on G-tubes (but not all)

**Results:**
- 26%: no oral intake post CRT/RT
- 58%: exercise adherence
- Oral intake during CRT/RT and adherence were independently associated better long–term diet level AND shorter duration of g-tube dependency

**Conclusions – in a nutshell**
- Treatment during CRT/RT: possibly effective
- Data from retrospective and few well controlled RCTs
- More research is required with larger sample sizes and more cohesive/uniform treatment regimens
A new treatment approach adapted for HNC pts
(Malandraki and Bauer Malandraki)

8-week rehabilitation protocol with 3 parameters:

1. Evidence-based oropharyngeal training increasing gradually in intensity
2. Targeted swallowing practice (TSP) increasing gradually in complexity
3. Adherence-inducing features

Malandraki et al. 2016, Arch Phys Med Rehab

IDR Treatment Schedule Example

Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday
--- | --- | --- | --- | --- | --- | ---
Morning: TSP + Ex 1 | Morning: TSP + Ex 1 | Morning: TSP + Ex 1 | Morning: TSP + Ex 2 | Morning: SESSION | Morning: TSP + Ex 2 | Morning: TSP
Afternoon: TSP + Ex 1 | Afternoon: TSP + Ex 2 | Afternoon: TSP + Ex 1 | Afternoon: TSP + Ex 2 | Afternoon: TSP + Ex 1 | Afternoon: TSP + Ex 2 | Afternoon: TSP
Evening: TSP + Ex 1 | Evening: TSP + Ex 2 | Evening: TSP + Ex 1 | Evening: TSP + Ex 2 | Evening: TSP + Ex 1 | Evening: TSP + Ex 2 | Evening: TSP

* Oral care

Case History

- 55 year old male
- presented to our clinic with a complaint of hoarseness
- Onset was sudden and persisted for five years
- H/o left vocal fold squamous cell carcinoma x 5 yrs.
- He had two biopsies followed by 31 radiation treatments.
- He preserved his vocal quality by using a “weak” (i.e. “soft”) voice.
Patient report about his voice

• He was a singer for "all my life". Sang in a band, and was on a record label for several years.
• Frustration: His voice required a 30-min warm up in order to sing for 10 minutes before he was too fatigued to continue.
• Breathy / raspy, husky and rough (after talking for awhile). There has been associated upper register compression, vocal fatigue.
• Upper middle to falsetto register break ("no falsetto whatsoever").

More Case/Social History

• The patient was re-evaluated at the VA by an ENT who noted white exudate, and recommended he see Dr. Halum.
• Previous medical history included esophageal web repair x 18 months.
• Social: The patient drinks about 1 bottle water daily; caffeine: 1 cup coffee daily + Diet Mountain Dew (24 oz daily); ETOH: none; TOB: cigarettes 1 ppd x 20 yrs, quit 20 yrs ago. Smoked cigars for a few years, but nothing after throat cancer until about 6 months ago.

Videostrobe #1

Initial Findings

• The patient's dysphonia is related to L vocal fold scarring / sulcus vocalis.
• "We discussed that unfortunately at this point we have no cure for vocal fold scarring, although we do have some treatment options that may improve the overall quality of the voice.
• While we can surgically excise the scar tissue or sulcus, there is a risk of worsening scarring and worsened voice outcome if scar / sulcus excision alone is performed.
• Alternatively, we could also perform serial steroid injections, which has no risk of increasing the scarring, and can improve the vocal fold compliance/mucosal waveform to help the voice.
• Use of the pKTP laser is also an option that I have seen help increase compliance of scarred vocal folds. Finally, in severe cases, scar elevation with insertion of a fascial or fat graft is the most aggressive approach to improve the voice, and I have generally found mild improvements after this procedure (with the worst outcomes just not seeing dramatic improvement or change).
• After discussing risks, benefits, and alternatives of all of these options with the patient, the decision was made to proceed with serial kenalog steroid injections and work with our speech language pathologist."
### Progression of treatment

- Serial Kenalog Injections – 3 injections over a period of 6 weeks.
- LPR therapy: RSI = 4, RFS = 20. Twice daily Omeprazole 40 mg.
- Voice therapy
- 3/18 first kenalog injection
- 3/24: voice evaluation + therapy session
- 4/1: second kenalog injection
- 4/7 voice therapy session #2
- 4/15: third kenalog injection
- 5/26 final voice therapy session, #3.

### Videostrobe #2 - kenalog injection #1

### Voice therapy

- Compliance issues, somewhat related to his work schedule. He attended 3 of the 4-6 recommended.
- So, no discharge notes, b/c comparison measures couldn’t be taken.
- Phone call made for 6-month follow-up.

Main tools in voice therapy for this patient:
1. Vocal Function Exercises
2. Resonant Voice (LMRVT)

### Voice therapy session 1

- Along with being an avocational singer, he installed corporate telecommunications, and used to record corporate client’s greetings, but no longer could. He also did employee training for 2-4 hour sessions, and this was increasingly problematic.
- Introductions to vocal hygiene/LPR support and VFE
Voice therapy 1, continued.

- Hygiene: patient drank about 16 oz water, and used multiple diuretics under physician supervision due to advanced kidney and liver disease. He was not under hydration restrictions, so recommended he trial up to 64 oz daily, with caveat that he monitor wrist/ankle swelling.
- Omeprazole 40 mg twice daily

Videostrobe #3: second kenalog injection 2 weeks later.

Voice therapy session #2

- 1 week post second injection
- VFE: times averaged to 13.77 seconds overall with range from 10-18 seconds.
- Cues: used a wall press for breath support, then branched down to a lunge over the knee. Also had the patient walk around while sustaining sound so that he couldn’t hold his breath.

Voice therapy session #2, continued.

- Introduced resonance, with good return of demonstration.
- He could discern “good buzzy” (resonance) vs. “bad buzzy” (glottal fry). This was initially confusing, but when he got it he reported “This is blowing my mind, man!”
- Directly correlated to decreased effort and a clearer voice for him.
Kenalog injection #3.

Voice therapy session 3

- Hygiene: AT GOAL.
- VFE #4: average MPT: 13.30 seconds with a range of 11-20 sec.
- Now, more effort associated with higher pitches. This didn’t show up before, because he didn’t have them.
- Cued patient for a “lighter, clearer sound”

Voice therapy session 3, continued.

- Other cues:
  - “Walk with energy”
  - Clarity
  - “don’t push air” – “release air”
- Successfully achieved good balance in sustained sound, and applied right away to vocalises and singing voice while standing still.
- Very happy with his singing voice in this session.

Vocal Scarring

- The diagnosis of “vocal fold scar” was an “end game” diagnosis for years, whether a result of injury or a result of surgery, with little recourse for the patient.
- Studies have recently been published regarding office based injections:
Vocal Fold Scarring

• ...And treatment of chronic vocal fold scarring using different agents, including hyaluronic acid-based injectables:

• In cases of vocal fold scarring, as well as many other diagnostics, there is more hope than ever for our patients.

Come see us at
The Voice Clinic of Indiana!