

1  **"Phonation Resistance Therapy (phoRTE)**

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2  **The Voice Clinic of Indiana**

▶ Our laryngology and SLP driven clinic specializes in a variety of voice, swallowing and upper airway disorders.

3  **Our Team**

These are often treated with a combination of therapy and medical/surgical interventions.



4  **We see a number of diagnostics that benefit from a strengthening therapeutic regimen:**



▶ Presbyphonia

▶ Sarcopenia

▶ Unilateral paresis

▶ Unilateral paralysis

▶ Neurologically compromised patients (i.e.: Parkinson's, Parkinson's Plus, etc)

▶ Unilateral atrophy

▶ Bilateral atrophy

5

6  **But first: Aging**

7  **Just a number...**

8  **Presbyphonia**

9  **Definitions vary somewhat**



▶ "(Presbyphonia) results from age-related laryngeal and respiratory degenerative changes, which lead to glottal incompetence and a decline in inspiratory and expiratory pressures." (Ziegler, Verdolini Abbott, et al)



▶ "The literature has described presbyphonia as "perceptually weak, hoarse, breathy, and unsteady, with the hallmark characteristic of presbyphonia, vocal fold bowing" (Lennel, Sandage & Johnson)



10  **64+ Population is growing**



▶ “The number of older adults (+64 years of age) in the United States is projected to rapidly increase to represent 20% of the population by 2030 (United States Census Bureau, 2017).”



▶ Bradley, Hapner and Johns (2014) reported an 18% increase in adults 64+ from 2000-2011 using US Census Bureau findings.

#### 11 **Prevalence of voice disorders in elderly**

▶ Within the aging population, the incidence of vocal disorders is *estimated* to be between 12% and 35%.



▶ Of these elders, it is believed that only 20% of people with voice disorders actually sought treatment, b/c they either didn't know such a thing existed, or because they thought it was a natural part of aging.



#### 12 **What is Sarcopenia?**

▶ Sarcopenia is the “loss of muscle mass, strength, and quality that is observed with aging. The loss of mass occurs gradually and has little effect on functional skills until threshold of loss is met.” (Thomas, Harrison and Stemple, 2008).



#### 13 **Sarcopenia, continued**

▶ *Presbyphonia* therefore, is the perceptual effect of sarcopenia on the thyroarytenoid muscle.



▶ *Sarcopenia* is the effect on all three laryngeal subsystems: respiratory, phonatory and resonance.

#### 14 **Time to go deeper...**

#### 15 **Basic Science Review: Muscle Fibers**

#### 16 **Basic Science Review**

#### 17 **Thyroarytenoid Muscle (TA)**



▶ *This means that the TA muscle is unique among skeletal muscles, in that it is a fast twitch muscle with high resistance to fatigue.*



#### 18 **Neural Innervation**

1

Skeletal Muscles

2

Thyroarytenoid

#### 19 **What does aging do to muscles?**

- 1 Skeletal Muscles
- 2 ▶ Reduced muscle mass
  - ▶ Reduction of both Type I and Type II fibers
  - ▶ Atrophy of Type II fibers
  - ▶ Fiber type grouping
- ▶
- ▶ Reduced speed and force of contraction, reduced strength and endurance.
- 3 Thyroarytenoid
- 4 ▶ Reduced muscle mass
  - ▶ Reduction of type I
  - ▶ Atrophy of type I
  - ▶ Maintenance of type II
  - ▶ No fiber grouping
- ▶ Reduced speed and force of contraction, reduced endurance.

20  **What does aging do to muscles?**

- 1 Skeletal Muscles
- 2 ▶ Reduction and size of motor neurons
  - ▶ Preferential loss of motor neurons to Type II fibers
  - ▶ Changes in neuromuscular junction
  - ▶ Alterations to myelin sheath
- 3
- Thyroarytenoid
- 4 ▶ No change in RLN
  - ▶ Changes in neuromuscular junction
  - ▶ Alterations to myelin sheath
- ▶

21  **What does aging do to muscles?**

- 1 Skeletal Muscles
- 2 ▶
  - ▶ Reduced proprioception (perception or awareness of the position and movement of the body)
- 3
- Thyroarytenoid
- 4 ▶
  - ▶ Reduced number of SLN nerve fibers
  - ▶ Reduced sensory nerve endings
  - ▶ No information on proprioception

22  **What is the goal of therapy?**

- ▶ A general goal of voice therapy is to restore the best voice possible, one that is functional for employment opportunities, social interactions, and activities of daily living (e.g., Colton, Casper, & Leonard, 2006)

23  **Three Subsystems of Voice**24  **What does exercise do to our muscles?**

- 1 Endurance:  
Marathon Runner
- 2 Resistance:  
Sprinter

25  **What does exercise do to our muscles**26  **Intensity and Frequency**

Muscles must be exercised at an intensity and frequency beyond their "normal" in order for muscle adaptations to occur.

27  **Overload**28  **Specificity**29  **Reversibility**

- 1 Intensity
- 2 Exercise

30  **Up-Regulation**31  **Down Regulation**32  **So, voice (and swallowing) therapy...**

▶Or is it?

33  **What does therapeutic exercise *in our elders* do?**

▶"The overall goal of exercise in older adults is to increase strength and function from current levels, not to reverse the effects of aging."

34  **What does therapeutic exercise *in our elders* do?**

▶Much of what we know from limb/skeletal muscle is NOT known in relationship to the TA, because of the difficulty getting live muscle biopsies after exercise...

35  **How did we do that? With our tool box!**

36  **What is phoRTE?**

Four exercises

- ▶ Loud, maximum sustained phonation on /a/.
- ▶ Loud ascending and descending glides over entire pitch range on /a/.
- ▶ participant-specific functional phrases using a loud and high voice ("calling over the fence"); and
- ▶ phrases from exercise #3 in a loud and low voice ("with authority")

37  **In Therapy:**

- Megaphone Mouth: The widened mouth and narrow pharynx allow for an acoustically safe "yell"
- 
- Patient is encouraged to achieve 80-90 dB throughout the session.
- 
- One session weekly
- ▶
- ▶

38  **What do studies say about comparing phoRTE with other treatment options for Presbyphonia?**39  **But what about the rest?**

- ▶
- ▶ Sarcopenia
- ▶ Unilateral paresis
- ▶ Unilateral paralysis
- ▶ Neurologically compromised patients (i.e.: Parkinson's, Parkinson's Plus, etc)
- ▶ Unilateral atrophy
- ▶ Bilateral atrophy

40  **Glottic insufficiency**41  **Choosing therapy patients wisely**

What do you think?

How do YOU make this call?

42  **What can we conclude?**

- ▶ In the case of phoRTE, it's new enough that we might be contributing to the research by trialing it's use to other, "comparable" diagnoses.

43  **Partner practice**44 45  **Bibliography**

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