Let's Blow Up A Balloon!: Breathing in Orthopedic Rehabilitation
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Breathe….

- Healthy adult: 12-15 breaths per minute
- 15/min x 60min x 24 hours = 21,600 breaths per day
- 7,884,000 breaths per year

Everyone Breathes Differently

- …yet, we all are used to breathe similarly at birth!

What Type of Breather Are You?

- Diaphragmatic
- Chest/Back
- Shoulder/Neck
- Good or Bad?

Diaphragm

- Dome-shaped muscle
- O: Vertebal: crura from bodies of L1, 2 (left), L1-3 (right)
- Costal: cartilage of 7th-12th ribs
- Sternal: xiphoid process
- I: Central Tendon
- A: Contraction – Inhalation
  Trunk stabilization
- Relaxation – Exhalation
  N: Phrenic nerve (C2-4)
**Diaphragm and Rib Orientation**

- **Inhalation**
  - Superior, anterior, lateral expansion
  - External rotation
- **Exhalation**
  - Inferior, posterior, medial movement
  - Internal rotation

**Notice Anything?**

- Right diaphragm is higher than left!

**Diaphragm and ZOA**

- **Zone of Apposition (ZOA)**
  - **R Diaphragm:**
    - Optimal ZOA
    - Ribs – internally rotated
    - Pelvis – posteriorly rotated
  - **L Diaphragm:**
    - Sub-optimial ZOA
    - Ribs – externally rotated
    - Pelvis – anteriorly rotated

**ZOA - Visualized**

- Watch for the Left Rib Flare! (sometimes bilateral)

**Diaphragm: Left vs Right**

- **Right-Left Difference**
  1. Neuromuscular
  2. Anatomically
  3. Functionally

  Innervated by a different nerve!

**Diaphragm: Left vs Right**

- **Right-Left Difference**
  1. Neuromuscular
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  3. Functionally

  R Diaphragm is given more mechanical advantage because of
  - Liver
  - Lungs (3 vs 2 lobes)
**Diaphragm: Left vs Right**

- **Right-Left Difference**
  1. **Neurally**
  2. **Anatomically**
  3. **Functionally**

- **R Diaphragm**
  - Respiratory-oriented
  - Needs to be maintained

- **L Diaphragm**
  - Too postural-oriented
  - Needs to regain proper mechanical advantage to effectively contract

**State of Hyperinflation**

**Intro to Diaphragmatic Breathing**

- **Step 1:** Be aware of your own breathing pattern
  - Breathe in through the nose, out through the mouth
  - As you breathe in and out quietly, palpate your anterior & posterior 1) neck, 2) chest, 3) abdomen and 4) lateral chest

- **Step 2:** Learn how to EXHALE!
  - Inhale through the nose
  - Exhale strongly through mouth
  - Hold a breath for 3-4 seconds
  - Place your tongue lightly against the roof of your mouth while pausing

**Breathing in Different Positions**
**Intro to Diaphragmatic Breathing**

- **Step 3: EXHALE against a balloon**
  1. Hold a balloon with the left hand
  2. Breathe in through your nose
  3. Exhale and blow up a balloon
  4. Hold a breath for 3-4 seconds
     - Do not pinch the balloon with teeth/fingertips
     - Pinch lightly with your lips and put your tongue on the roof of your mouth, stop the airflow
  5. Take another breath in through your nose
     * Without opening the rib cage!
  6. Exhale and blow up again

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**Proper Breathing Can…**

- Maximize the efficiency of the respiratory and postural roles of the diaphragm\(^5,13\)
  - Can indirectly treat many orthopedic conditions
    - LBP,\(^9,10\) Sciatica,\(^9\) Thoracic outlet syndrome,\(^11\) Asthma\(^\text{12}\)
- Promote relaxation\(^14\)
- Improve ROM?

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**References**


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**Special Thanks…**

- Postural Restoration Institute
  - http://www.posturalrestoration.com/