Mechanics and Pathomechanics of
the Muscles of the Face and Eyes

LEARNING OBJECTIVES:

At the end of this laboratory exercise the student will be able to:

- Observe and palpate facial muscle activity at the eyes, nose, and mouth
- Examine eye movements and describe the axes of motion
- Identify what muscle(s) contributes to specific facial expressions

NOTE: Answers to the Thought Questions from the chapter may be found at the end of this document.

Palpations

1. Palpate your partner’s orbicularis oculi during tight eye closure, then gentle closure.

2. Palpate the occipitalis while reciprocally contracting and relaxing the frontalis. Is there a contraction of the occipitalis?

3. Palpate the zygomaticus minor and major during a smile. Try to contract only one side.

Normal Movement

1. Can your partner isolate the motion to wiggle his or her ears?

2. Observe bilateral wide eye opening; Is it symmetrical? Is relaxed eye opening symmetrical?

3. Consider the skin creases on the face. Identify related facial muscles.

4. Observe the nose and nostrils as your partner takes a deep breath. Do they move? What facial muscles were used?

   Answer: Possible active muscles include the alar and transverse portions of the nasalis, dilator naris, and the depressor septi.

5. Observe normal eye movement and the axis of rotation as your partner visually follows your finger tip
   To the right and left
   
   Answer: Vertical axis
   
   Up and down
   
   Answer: Mediolateral axis
   
   Up and to the right
   
   Answer: Combined mediolateral and vertical and perhaps A–P as well
   
   Down and to the left
   
   Answer: Combined mediolateral and vertical and perhaps A–P as well

As you move your finger toward the tip of his or her nose
**Answer: Vertical and A–P axes**

Are all eye movements symmetrical? Do the movements have single or multiple axes?

**Application**

1. What facial muscles are active as a musician plays the trumpet?

   **Answer:** Buccinator, orbicularis oris; perhaps mentalis, levator labii superioris, levator anguli oris

   Compare these with facial muscles used to play the flute.

   **Answer:** Lip position changes, so different lip muscles are used; no levator labii superioris but perhaps mentalis or depressor labii inferioris

2. What facial muscles are used as you brush your front teeth?

   **Answer:** Levator labii superioris and perhaps depressor and levator anguli oris

3. Perform the following facial expressions and decide which facial muscle(s) would be used:

   **Smile**

   **Answer:** At least the zygomaticus and risorius, probably also the levator labii superioris

   **Squint**

   **Answer:** At least the orbicularis oculi, probably also the corrugator

   **Pout**

   **Answer:** At least the mentalis

   **Sneer**

   **Answer:** At least the levator anguli oris

4. How would you decrease resistance to exercise a weak zygomaticus muscle or levator anguli oris muscle?

   **Answer:** Provide active assistance by moving the mouth in the direction the muscle works. Stretching the muscle by pulling the mouth in the opposite direction might also assist by increasing the strength of contraction. Lie supine so the muscles work with the assistance of gravity.

5. How could you functionally test the strength of the following facial muscles?

   orbicularis oris

   **Answer:** Ask subject to pucker to kiss or to blow out a candle.

   orbicularis oculi

   **Answer:** Ask subject to close the eyes.

   buccinators

   **Answer:** Ask subject to hold air in the mouth, to blow out a candle, or to blow on a feather.

6. Your patient demonstrates right-sided facial weakness. How would you test to confirm facial nerve involvement?

   **Answer:** Examine the function of the frontalis and superior portions of the orbicularis oculi. Right-sided weakness of these muscles suggests a facial nerve palsy; little or no weakness in these suggests an upper motor neuron lesion.
Thought Problems with Answers

1. Your patient appears in your office with facial weakness. What sign(s) suggests that the weakness is likely the result of a peripheral nerve palsy and not the result of an upper motor neuron lesion such as a stroke?

**ANSWER:** Weakness of muscles on one side of the face, including the frontalis is suggestive of a peripheral nerve injury rather than an upper motor neuron lesion. Because the branch of the facial nerve that innervates the frontalis receives input from both motor cortices, the frontalis is typically spared when the injury is within the CNS.

2. Describe three exercises that could be used to activate the orbicularis oris.

**ANSWER:** Three exercises to activate the orbicularis oris include whistling, blowing and puckering for a kiss. Making speech sounds such as “puh”, “buh” or “oh” also activate the orbicularis oris.