Stability of Orofacial Strength Measures

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Background and Purpose
- Objective measures of lingual strength have been available for over 15 years (Robin, Somodi & Luschei, 1991)
- Objective measures have been able to measure lingual pressure in elevation only

One of the most common instruments is the Iowa Oral Performance Instrument (IOPI)

Subjective measures of tongue strength during lateralization and protrusion along with elevation are better predictors of swallow function than objective measures of tongue strength obtained during elevation alone (Clark, et al., 2003)

Participants
- 40 healthy adults
  - 17 male, 23 female
  - 18 – 67 (mean 37.8 yrs)
Methods

- Orofacial strength measures were obtained during:
  - Lingual Elevation
  - Lingual Protrusion
  - Right and Left Lingual Lateralization
  - Right and Left Cheek Compression

Methods

- Measures were obtained from each subject on three separate occasions
- Sessions were scheduled at a minimum of 24 hour intervals
- Consistent with standard IOPI procedures, all measures were obtained three times in succession
  - the maximum pressure across the three trials was recorded as the strength measure

Methods

- Elevation
  - As described in the IOPI manual
    - Bulb placed on the anterior hard palate
    - Participant instructed to push the tongue up against the bulb, "as hard as you can."
  - No adaptor

Methods

- Protrusion
  - Measures were obtained by positioning the IOPI adaptor between the incisors with the bulb facing the anterior tongue
  - Participants were instructed to push the tongue forward against the bulb

Methods

- Lateralization
  - The pads of the adaptor were held between the premolars and first molars on the side of the mouth
    - IOPI bulb was secured in a fixed position against the lingual surface of the adaptor
    - Participants were instructed to push the tongue to the side against the IOPI bulb
  - Lateralization measures were obtained for both the right and left sides
Methods

- Buccal compression
  - The pads of the adaptor were held between the premolars and first molars on the side of the mouth
  - IOPI bulb was secured in a fixed position against the buccal surface of the adaptor
  - Participants were instructed to squeeze each cheek inward against the bulb

Results

Do measures of orofacial strength change significantly over three baseline measurement periods?

Results

- $F(2,37) = 9.97, p < .01$
  - 1 < 2 and 3 for all measures
  - 2 and 3 did not differ
- No interaction with measure type
Discussion
- Findings suggest that a learning effect is typical between the initial and second session.
- By the third session, measures are appropriately stable.

Discussion
- Initial measures may underestimate true strength measures.
  - Average difference between measures obtained during the first and subsequent sessions:
    - < 5 kPa for the lingual measures
    - < 2 kPa for the cheek measures

Discussion
- Clinicians intending to utilize these measures to demonstrate the effects of intervention or disease process should obtain repeated baselines to control for learning effects.

Implications
- Subjects should establish consistent placement of IOPI bulb and adapter.
- Clinicians should obtain 2 baseline measures to account for the learning effect.

Directions for Future Research
- Assign a control group for a longer study (i.e. 9 or 12 weeks) to determine if a learning effect occurs over a greater period of time.
- Examine stability in participants with speech and/or swallowing impairments.

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References

