

ULTRASOUND EVALUATION OF SWALLOWING IN PEOPLE WITH NEUROLOGICAL DISEASES – A PILOT STUDY

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BACKGROUND & AIMS

- Ultrasound Evaluation of Swallowing (USES) is an emerging tool for swallowing assessment
- Clinical translation could add another tool to SLTs' swallowing assessment
- Aims:
 - Feasibility and requirements of data acquisition for USES in people with neurological diseases
 - Identify hyoid metrics based on USES data
 - Evaluation of patient's experience

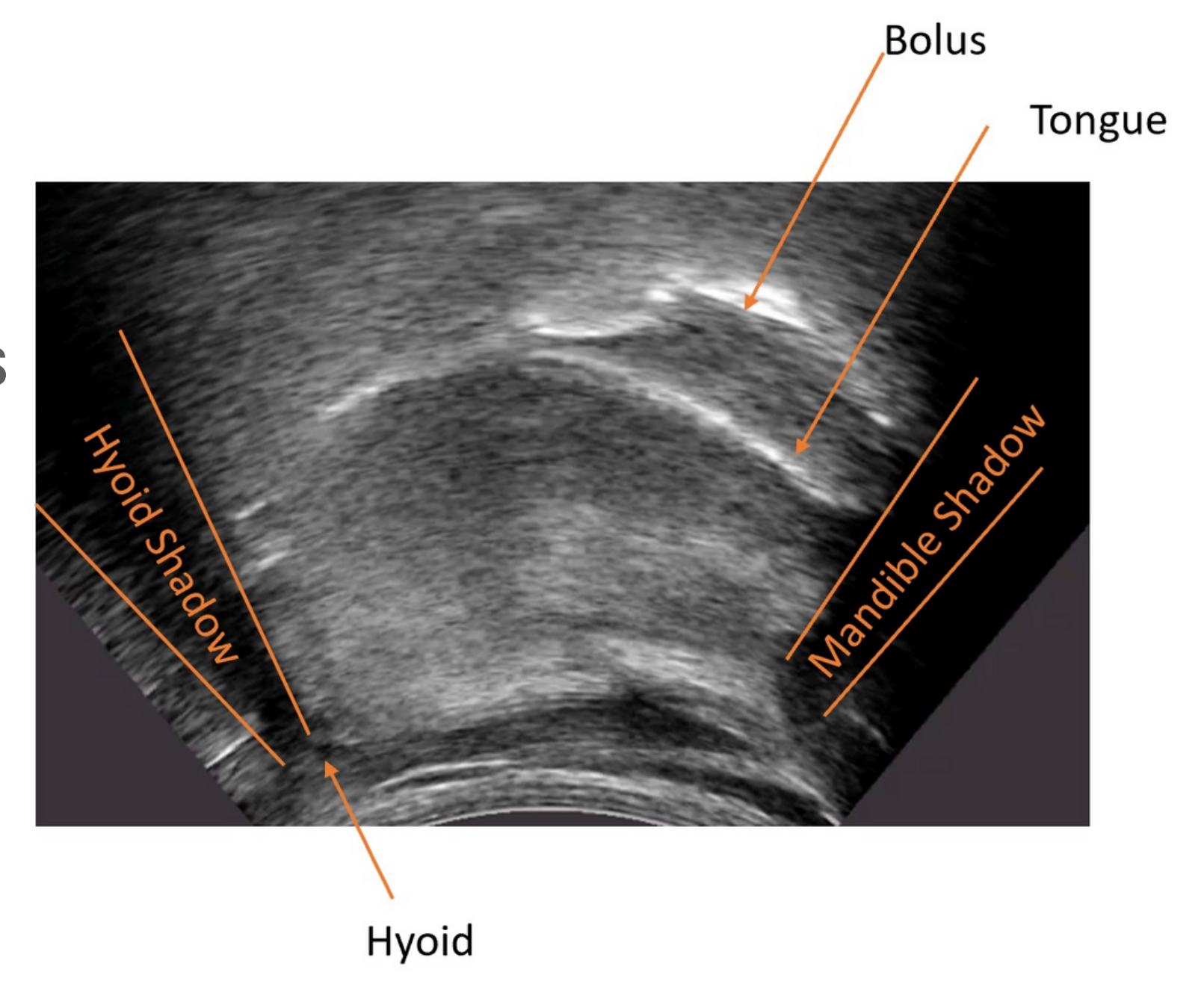
USES SETUP



- Pocket-sized micro-ultrasound system operating in standard B-mode
- 2-4 MHz 60mm radius convex probe
- UltraFit headset held the probe in a stable midsagittal position

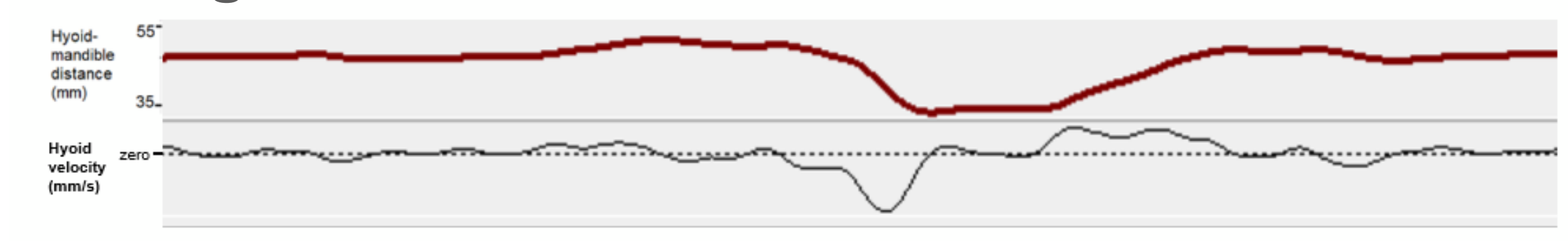
METHODS

- Four people with neurological diseases
 - 1 female, 3 males
 - Age: 43-50 years
 - Diagnosis: Myotonic Dystrophy Type 1
- USES performed after undertaking VFSS on the same day
- Recording of
 - 2 x saliva swallow
 - 5 x 5ml water bolus



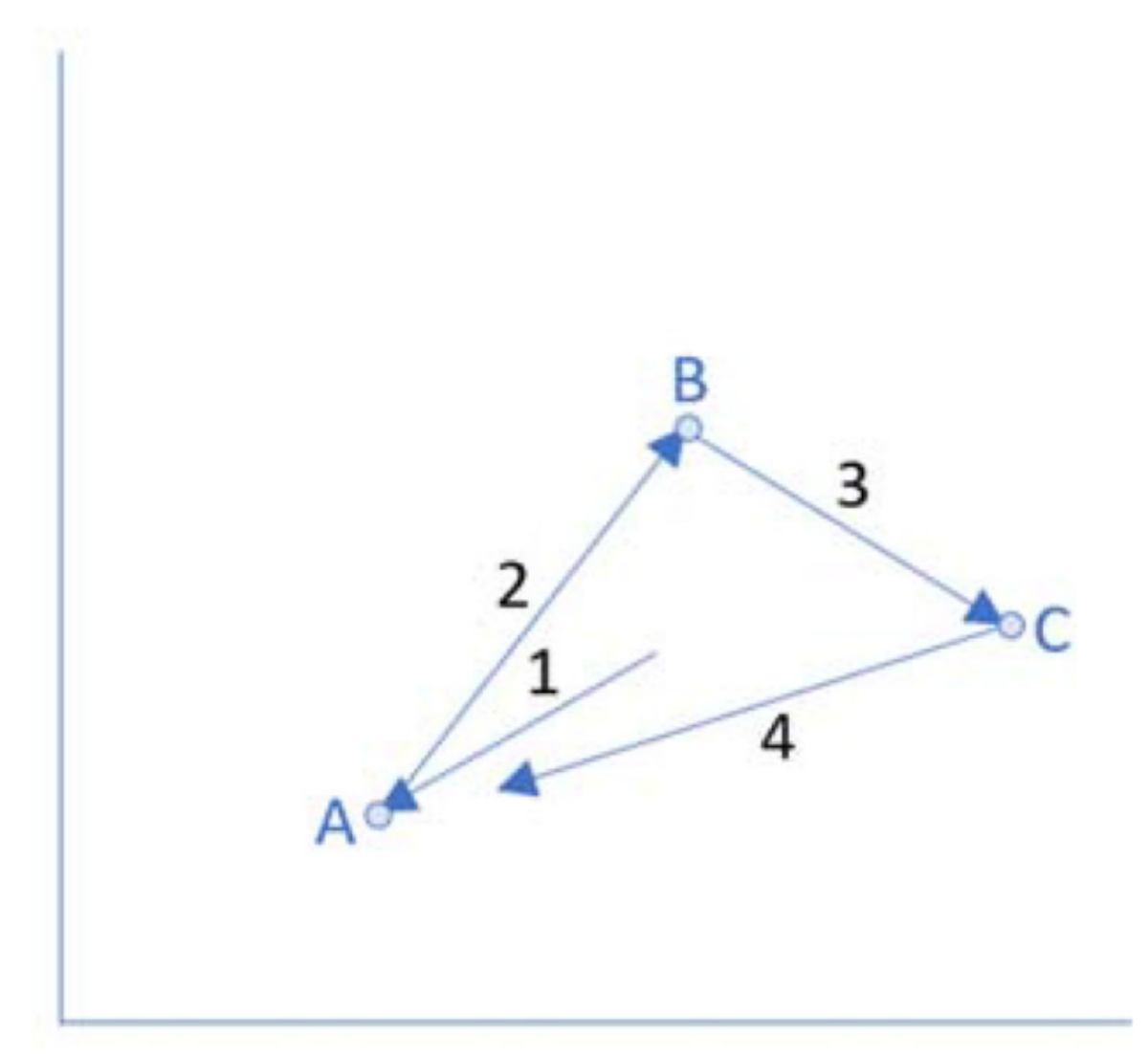
ANALYSIS

- Analysis was based on the methods of Ma & Wrench (2022a)
- Manual hyoid tracking by annotating the base of the hyoid shadow in all keyframes
- 1. Quantitative hyoid kinematics: Patterns of hyoid displacement & velocity were extracted from the manual tracking



The diagram above displays the hyoid displacement (top red line) and the hyoid velocity (bottom black line) across time (x-axis) during a single swallow.

2. Quantitative hyoid trajectory within a swallow. Schematic diagram based on healthy swallow as demonstrated by Ma & Wrench (2022) (see below)



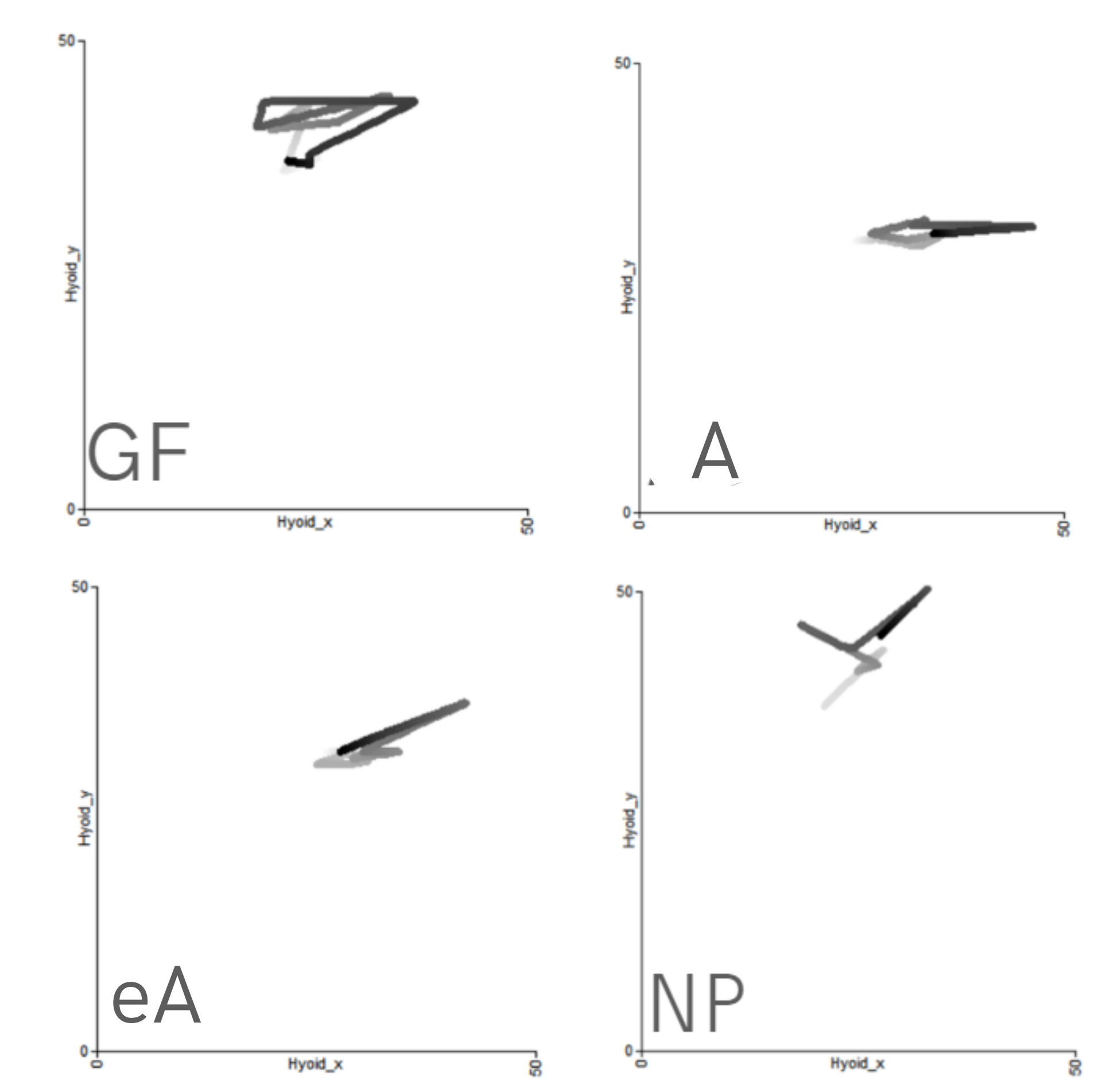
1. Retraction (to A) to make space for the bolus
2. raising to B to aid tongue dorsum raising;
3. advancing to C leading to laryngeal elevation
- 4., relaxation and returning to the resting position.

WHAT DID WE FIND & WHAT'S NEXT?

- 3 preliminary patterns were identified: a good fit to Ma & Wrench (2022a) schematic, anterior only and short elevation & long anterior movements
- Notable intra-person variability
- Variable patient feedback
- Future directions: Larger scale clinical studies looking at hyoid trajectory in participants with neurogenic dysphagia

RESULTS

- Qualitative analysis of 5ml bolus swallows (N=20) showed:
 - 60% (N=12) “fit” the schematic (GF)
 - 40% (N=8) did not fit
- Of the swallows judged not to fit, the following patterns were identified:
 - Anterior (A) (N=3)- indicative of only anterior hyoid movement with minimal-no elevation.
 - Short elevation & long anterior movement (eA) (N=3) - hyoid movement is predominately anterior.
 - No pattern (NP) (N=2)
- Key qualitative observations included:
 - Notable between subjects variability
 - Intra-person variability across trials
 - Reduced hyoid movement in all planes for saliva swallows



Patient Experience when compared with VFSS

- Lower rating for some patients on comfort and the ease of swallow
- Better rating in the taste of drink
- In choosing between ultrasound or VFSS for their next swallowing assessment, patients highlighted
 - portability of ultrasound
 - amount of information from the image