**Supplementary Material A**

List of Timing and Pixel-Based Measures Collected with Definitions

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| **Timing Intervals** |  | |
| Swallow Reaction Time (SRT) | | The difference between time of swallow onset (initial hyoid bone movement in anterior-superior direction) and bolus passing the ramus of mandible (ROM). |
| Time-to-LVC | | Time-to-laryngeal vestibule closure (LVC) was measured as the difference between SRT and time-of-LVC (when the arytenoids seal against the underside of the epiglottis or seal as much as possible). |
| LVCd | | LVC duration (LVCd) was defined as time-of-LVC to LVC-off (when the arytenoids first begin to separate from the underside of the epiglottis). |
| Time-to-Peak Hyoid Frame | | Time-to peak hyoid position was measured from the initial anterior-superior hyoid burst to the identified frame of peak hyoid position. |
| **Pixel-Based Measures** | |  |
| Pharyngeal Area at Maximal Constriction | | Traceable area remaining in the pharynx at the height of the swallow, prior to the descent of the larynx, including air and bolus material. |
| Vallecular Residue | | Traceable (in pixels) residue housed within the anatomical boundary of the visible epiglottic area up to the apex of the epiglottic leaf. |
| Pyriform Residue | | Traceable (in pixels) residue housed within the anatomical boundary of the pyriform sinuses, above the UES, and anatomically bounded by the apex of the arytenoids process. |
| Other Pharyngeal Residue | | Traceable (in pixels) residue remaining elsewhere in the pharynx including the posterior pharyngeal wall and/or aryepiglottic folds. |
| Total Residue | | The summed total of vallecular, pyriform, and other pharyngeal residue to derive an overall amount of residue present in the pharynx. |
| Peak Hyoid Displacement | | The frame of Peak XY hyoid position during the swallow was identified and measured from the anterior-inferior corner of the C4 vertebra. |
| UES Maximum Opening | | The width of the upper esophageal sphincter (UES) at its widest point from the posterior esophageal wall to the anterior anatomical boundary of the UES, in pixels. |