Swallow function in children with suspected aspiration: objective assessment using pharyngeal automated impedance manometry (AIM).

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Abstract

AIM: To apply a new method, pharyngeal automated impedance manometry (AIM), as an objective assessment tool of swallow function relevant to aspiration in a cohort of pediatric patients with dysphagia.

Methods: We studied 20 children (mean age 6yrs (5mo-13.4yrs)) referred for videofluoroscopy to assess aspiration risk with simultaneous manometry-impedance. Fluoroscopic evidence of aspiration was scored using a validated aspiration-penetration score (PAS). Swallowing of 5ml and/or 10ml saline boluses was recorded with a solid state pressure-impedance catheter. AIMplot software was used to derive the swallow risk index (SRI) and other functional variables (Omari et al 2011): peak pressure, pressure at nadir impedance, time from
nadir impedance to peak pressure, the interval of impedance drop in the distal pharynx (flow interval, UES relaxation interval, nadir UES pressure, UES intrabolus pressure and UES resistance. In addition UES nadir impedance was measured as a correlate of UES diameter and the integrated ratio of nadir impedance to impedance was measured as a marker of post swallow residue. Data for all recorded liquid swallows were averaged for each individual. Non-parametric grouped data are presented as medians [IQR range] or as mean±standard deviation and compared using Mann-Whitney Rank Sum Test. For multiple comparisons Kruskal-Wallis ANOVA on ranks with pair-wise multiple analysis procedures (Dunn's method) was used. Correlation was determined using a Spearman Rank Order Correlation.

**Results:** Six of twenty children presented with deglutitive aspiration on videofluoroscopy. Of 58 liquid swallows analysed, in 9 aspiration was observed. Multiple logistic regression identified longer flow interval (p<0.05) and higher SRI (p<0.05) and increased pressure in the UES during maximal bolus flow (p<0.05) as the dominant risk variables predictive of aspiration in children. Each of these non-radiologically derived pressure-flow variables correlated with higher aspiration scores on videofluoroscopy (p<0.01).

**Conclusions:** We present novel, preliminary findings in children with deglutitive aspiration suggesting that pharyngeal AIM can non-radiologically detect alterations in pressure-flow characteristics of swallowing that predispose to aspiration risk.