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LETTER TO THE EDITOR

Effect of esophageal length on high-resolution manometry metrics: Extension to the neonatal population

Dear Editor,

The current state-of-the-art diagnosis of esophageal motility disorders is based on esophageal pressure topography (EPT) using the Chicago classification (CCv3.0).[1] The proposed standardized approach is based on EPT reference values from adult cohorts. However, without adjusting for esophageal length, the adult reference values will overestimate the prevalence of major motility disorders in pediatric patients.[2-4] The optimal form of reference value adjustment for pediatric use remains to be determined as former studies examining age- and size-related trends have been limited by the inclusion of patients with known dysphagia-causing medical diagnoses such as achalasia and esophageal atresia. Furthermore, published datasets do not extend to the infant population for which the appropriate level of adjustment is currently unknown.

As part of an ongoing research program, we have acquired esophageal high-resolution manometry (HRM) data in 12 healthy young infants (aged 31-65 days, 10 males). We have been able to compare these data with a cohort of 57 pediatric patients (aged 1-17.4 years, 27 males) referred for HRM. The cohort comprised 35 cases from a previous publication[4] and 22 new cases. Patients with esophageal atresia, neuromuscular disease, unequivocal achalasia subtypes, and past antireflux surgery were not included. The following EPT metrics were derived using the Web application *Swallow Gateway* (*swallowgateway.com*): 4-second integrated relaxation pressure (IRP4), distal latency (DL), and distal contractile integral (DCI).

The esophageal length (from upper esophageal sphincter to esophagogastric junction) of otherwise healthy young infants ranged from 5.7 to 8.6 cm. By using the linear best fit for esophageal length trends seen in the pediatric patients, data derived from infants were found to lie within the predicted continuum (Figure 1). Indeed, we found that after adjustment for esophageal length, the number of infants below the diagnostic cutoff values decreased.

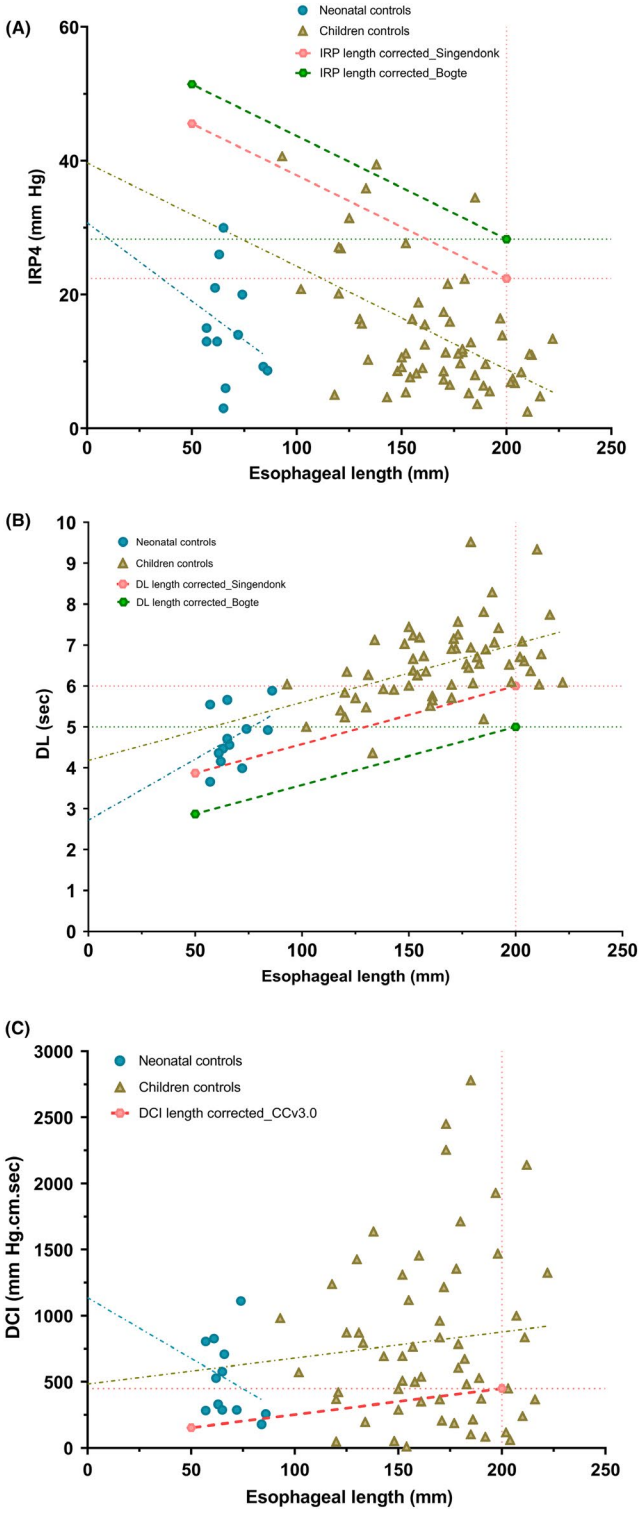

FIGURE 1 Esophageal pressure topography metrics in relation to esophageal length. Scatter plot of A, IRP4; B, DL; and C, DCI averaged per patient. Healthy infants (n = 12), as well as pediatric patients (n = 57), from our cohort are presented. Adult cutoff values described by Singendonk et al[4] and Bogte et al[5] and CCv3.0[1] are displayed (horizontal lines). Adjusted cutoff values are presented parallel to the trend line and projecting from the mean adult esophageal length of 20 cm[4] at diagnostic thresholds. DL and DCI decrease while IRP4 seem to increase related to shorter esophagus. The number of infants below the cutoff line decreased for all investigated metrics: IRP4 from 33% to 0%, DL from 100% to 17%, and DCI from 50% to 8%

In conclusion, these data further underscore the need to adjust diagnostic cutoff values for EPT metrics according to esophageal length. Failure to do so will lead to overdiagnosis of esophageal motility disorders in pediatric patients of all ages.

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CONFLICT OF INTEREST

Nathalie Rommel and Taher Omari hold a patent on AIMplot, the software used to analyze the pressure-flow data. The open access Swallow Gateway™ resource is provided and hosted by Flinders University. None of the other authors have any potential conflict of interest to declare.

AUTHOR CONTRIBUTION

MR was the principal investigator for the neonatal controls and designed the presented study. She wrote the first draft of this letter and revised the manuscript based on reviews by the co-authors. NR developed the neonatal study design, acquired all the neonatal data, and oversaw the data analysis. She reviewed and supervised the finalization of the manuscript. TO was the principal investigator of the pediatric study and provided the pediatric data. He is co-author of the original study. He involved in developing the current study design and providing technical support on the software analysis. He made a significant contribution in critically reviewing the manuscript. KA was involved in the neonatal study design and made a significant intellectual work in critically reviewing the manuscript. RA involved in the inclusion of subjects of the pediatric study and made significant intellectual work in critically reviewing the manuscript. He is co-author of the original study.

Maissa Rayyan[1,2]
Taher Omari[3]
Rammy Abu-Assi[4]
Karel Allegaert[2,5,6]
Nathalie Rommel[7,8,9]

[1]*Neonatal Intensive Care Unit, University Hospitals Leuven, Leuven, Belgium*
[2]*Department of Development and Regeneration, KU Leuven, Leuven, Belgium*
[3]*College of Medicine and Public Health, Flinders University, Adelaide, South Australia, Australia*
[4]*Gastroenterology Unit, Women's and Children's Hospital, Adelaide, South Australia, Australia*
[5]*Department of Pharmaceutical and Pharmacological Sciences, KU Leuven, Leuven, Belgium*
[6]*Department of Clinical Pharmacy, Erasmus Medical Center, Rotterdam, the Netherlands*
[7]*Department of Neurosciences, KU Leuven, Leuven, Belgium*
[8]*Neurogastroenterology and Motility, University Hospitals Leuven, Leuven, Belgium*
[9]*Translational Research Center for Gastrointestinal Disorders (TARGID), Leuven, Belgium*

Correspondence
Maissa Rayyan, Neonatal Intensive Care Unit, University Hospitals Leuven, Herestraat 49, B-3000 Leuven, Belgium.
Email: maissa.rayyan@uzleuven.be

ORCID

Maissa Rayyan https://orcid.org/0000-0001-5718-6887
Taher Omari https://orcid.org/0000-0001-5108-7378

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