# Multidisciplinary Aerodigestive Evaluation in Pediatric Vascular Ring and Sling Management: Retrospective Study

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# Objectives

- Determine the value of our integrated practice unit in the care of vascular ring population
- Assess whether aerodigestive clinic (ADC) evaluation is associated with improved clinical outcomes, particularly rate of residual symptoms in children undergoing surgical repair of vascular rings

# Methods

- Retrospective cohort  from RCHSD (2011–2024)
- 219 pediatric patients with vascular ring diagnosis
- Grouped by preop **ADC evaluation** vs. **no ADC evaluation** (or postop only)
- **Primary outcome**: residual respiratory/feeding symptoms post-op and >1 year post-op
- Statistical analysis: logistic regression

# Demographics

| Category | N |
|---|---|
| **Total Cohort** | 219 |
| **Preop ADC Involvement** | 91 |
| **Postop ADC Involvement** | 10 |

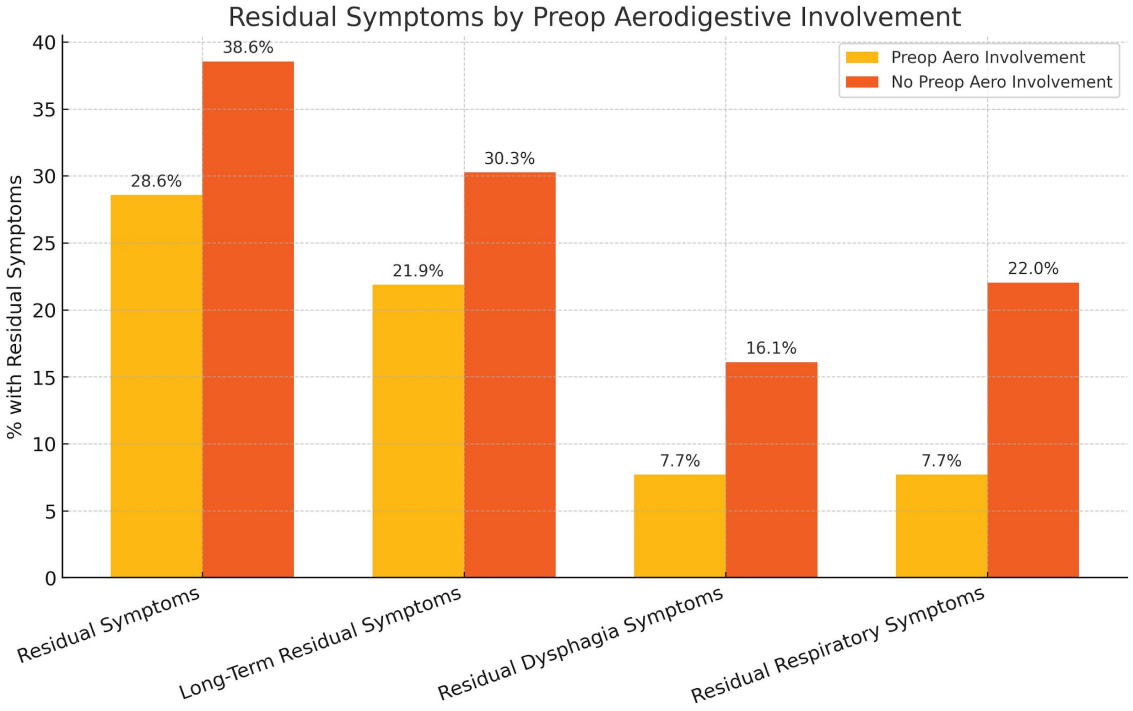
| Category | Preop ADC (n=91) | No Preop ADC (n=128) | Chi-square p-value |
|---|---|---|---|
| **Gender** | | | 0.5449 |
| *Male* | 43 (47.3%) | 67 (52.3%) | |
| *Female* | 48 (52.7%) | 61 (47.7%) | |
| **Race** | | | 0.5164 |
| *Asian* | 9 (9.9%) | 10 (7.8%) | |
| *Black/African American* | 5 (5.5%) | 7 (5.5%) | |
| *White* | 41 (45.1%) | 69 (53.9%) | |
| **Ethnicity** | | | 0.779 |
| *Hispanic* | 40 (44.0%) | 59 (46.1%) | |
| *Non-Hispanic* | 51 (56.0%) | 67 (52.3%) | |

# VR Diagnosis

| Category | Preop ADC (n=91) N (%) | No Preop ADC (n=128) N (%) | Chi-square P-value |
|---|---|---|---|
| **VR Subtype** | | | |
| *Double Arch* | 5 (5.5%) | 39 (30.5%) | <.0001 |
| *Right Arch w/ Aberrant Left Subclavian* | 74 (81.3%) | 87 (68.0%) | |
| *Left Arch w/ Right Ductus* | 10 (11.0%) | 2 (1.6%) | |
| *Pulmonary Artery Sling* | 2 (2.2%) | 0 (0.0%) | |

# VR Repair

| Category | Preop ADC (n=91) | No Preop ADC (n=128) | Chi-square P-value |
|---|---|---|---|
| **VR Repair Performed (n=118)** | 35 (38.5%) | 83 (64.8%) | 0.0002 |
| **Median Age at Repair (days, IQR)** | 510 (270–1732) | 309 (99.5–684) | 0.018 (wilcox rank sum) |




Residual Symptoms: OR = 0.58, 95% CI = 0.24–1.34, P = 0.215
Long-Term Residual Symptoms: OR = 0.73, 95% CI = 0.21–2.17, P = 0.587
Residual Dysphagia Symptoms: OR = 1.27, 95% CI = 0.26–4.85, P = 0.74
Residual Respiratory Symptoms: OR = 0.54, 95% CI = 0.14–1.7, P = 0.326

# Multivariate Analysis: Residual Symptoms

| Independent Variable | OR | CI lower | CI upper | p-value |
|---|---|---|---|---|
| Preop ADC evaluation | 0.679 | 0.24 | 1.84 | 0.451 |
| Double aortic arch | 2.08 | 0.833 | 5.29 | 0.117 |
| Age at repair >1yo | 0.781 | 0.313 | 1.9 | 0.588 |
| 22q11 deletion | 1.35 | 0.198 | 9.29 | 0.754 |
| Preop respiratory medication needed | 5.59 | 2.32 | 14.3 | **0.000185** |
| Preop dysphagia symptom present | 1.62 | 0.688 | 3.96 | 0.277 |

# Multivariate Analysis: Long-Term Residual Symptoms (>1yr)

| Independent Variable | OR | CI lower | CI upper | p-value |
|---|---|---|---|---|
| Preoperative ADC evaluation | 0.708 | 0.184 | 2.42 | 0.593 |
| Double aortic arch | 1.36 | 0.483 | 3.78 | 0.553 |
| Age at repair >1yo | 0.854 | 0.303 | 2.32 | 0.759 |
| 22q11 deletion | 0.929 | 0.109 | 6.01 | 0.94 |
| Preop respiratory medication needed | 3.42 | 1.26 | 9.75 | **0.0175** |
| Preop dysphagia symptom present | 1.55 | 0.585 | 4.24 | 0.381 |

# Aero Diagnostic Yield (ENT/Pulm)

| Finding | | N (%) |
|---|---|---|
| **Tracheomalacia** | *None* | 28 (27) |
| | *Mild (<25%)* | 14 (13) |
| | *Moderate (25-75%)* | 20 (19) |
| | *Severe (>75%)* | 6 (1) |
| | | |
| **Bronchomalacia** | *Yes* | 41 (39) |
| | *No* | 26 (25) |
| | | |
| **Secondary airway lesion on bronchoscopy** | | 16 (15) |
| | *Additional airway surgery recommended* | 6 (1) |

| Finding | | N (%) |
|---|---|---|
| **BAL** | *Abnormal* | 17 (16) |
| | *Normal* | 34 (32) |
| | *Not done* | 49 (47) |
| | | |
| **Additional respiratory medications recommended by ADC Pulmonologist** | *Yes* | 16 (15) |
| | *No* | 76 (72) |

# Diagnostic Yield (GI/SLP/OT)

| Finding | | N (%) |
|---|---|---|
| **EGD pathology other than esophageal compression** | | 10 (10) |
| | *EoE* | 3 (3) |
| | *Pathologic reflux* | 6 (6) |
| | *Neutrophilic esophagitis* | 1 (1) |
| | | |
| **Non-esophageal phase dysphagia present on feeding evaluation** | | 29 (28) |
| | | |
| **Preop stages of dysphagia** | *Oral* | 3 (3) |
| | *Pharyngeal* | 8 (8) |
| | *Oral and pharyngeal* | 13 (12) |
| | *Pharyngeal and esophageal* | 2 (2) |
| | *Oral, pharyngeal, and esophageal* | 26 (25) |
| | | |
| **Other GI disease not related to VR** | | 28 (27) |

# Clinical Decision Making

| Outcome | | N (%) |
|---|---|---|
| **Decision to repair (patients with preop ADC eval)** | | |
| | *Repair for resp symptoms* | 13 (14) |
| | *Repair for dysphagia symptoms* | 8 (9) |
| | *Repair for resp and dysphagia symptoms* | 18 (20) |
| | ***Repair not yet recommended*** | 54 (59) |

# Summary

- Preoperative ADC evaluation identified:
  - Additional airway anomalies unrelated to vascular ring
  - Chronic tracheobronchitis needing additional treatment
  - Esophageal mucosal diseases needing additional medical management
  - Non-esophageal phase dysphagia as alternative explanation of dysphagia symptoms

# Summary

- Vascular ring repair **not yet recommended** in 59% of VR patients with pre-op ADC evaluation
- ADC involvement was associated with:
  - **Trend toward reduced long-term respiratory and dysphagia symptoms after surgical repair**
  - **Earlier detection of comorbid conditions informing surgical planning**

# Future Directions

- Prospective, multicenter studies to validate findings
- Refine standardized ADC evaluation protocols for vascular ring patients
- Assess long-term outcomes including quality of life and functional improvement
- Explore cost-effectiveness of routine ADC involvement

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# Comments