An Overview on Pediatric Esophageal Disorders

Annamaria Staiano
Department of Translational Medical Sciences
University of Naples “Federico II”
Case report
F.C. 3 year old boy

- Preterm born from emergency cesarean delivery for uterine haemorrhage at the 28th week of GA
- At birth: weight 860 gr
- Hospitalized from birth in Neonatal Intensive Care for 5 months
- From birth several episodes of broncho-pneumonia with cyanosis
- Dysphagia
Case report: FC 3 year old boy

Main clinical problem

Recurrent Bronchopneumonia

Differential Diagnosis

- **Chest X-ray:** bilateral shadow in the lower lobes
- **Allergy test:** negative
- **Total Ig and Ig subclasses:** normal
- **Sweat test:** negative.
- **Serology for Mycoplasma and Clam. Pneumoniae:** negative
- **Mantoux:** negative
- **pH-impedance monitoring:** positive
- Treatment with PPI (2 mg/kg/die) -> initial improvement
- New episode of bronchopneumonia during PPI treatment
Case report: FC 3 year old boy

Barium Swallow

Esophagus moderately expanded with reduction of the calibre at level of distal esophagus without obstacle to the transit of the oral contrast with minimal inhalation of barium in right lung.
Case report: FC 3 year old boy

Main clinical problem

Esophageal stenosis

Etiology

- Congenital stenosis
- Peptic stenosis
- Stenosis associated with IBD
- Iatrogenic injury: e.g. caustic ingestion

Jones DW et al, Pediatr Surg Int 2010
Case report: FC 3 year old boy

Upper GI endoscopy
Case report: FC 3 year old boy

Diagnosis

Recurrent Bronchopneumonia in a patient with Tracheoesophageal Fistula (type H)

- The gold standard for the diagnosis of tracheoesophageal fistula is bronchoscopy, but in this case it wasn’t necessary since the diagnosis was already clear from upper GI endoscopy.
# Pediatric esophageal disorders

## Motility disorders

**PRIMARY**
- Achalasia
- Diffuse esophageal spasm
- Nutcracker esophagus

**SECONDARY**
- Neural diseases
- Muscular diseases
- Metabolic diseases

## Structural and organic disorders

- Esophageal atresia
- Eosinophilic esophagitis
- GERD
- Caustic ingestion
- Swallowing disorders
- Congenital stenosis
Pediatric esophageal disorders

Clinical presentation of motility disorders

- Dysphagia
- Chest pain / Heartburn
- Foreign body impaction
- Vomiting
- Failure to thrive
<table>
<thead>
<tr>
<th>Method</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper endoscopy</td>
<td>Evaluation of structural disorders of the esophagus</td>
</tr>
<tr>
<td>Barium esophagography</td>
<td>Evaluation of esophageal transit and partially assessment of motor function</td>
</tr>
<tr>
<td>Radionuclide transit studies</td>
<td></td>
</tr>
<tr>
<td>Esophageal intraluminal impedance</td>
<td></td>
</tr>
<tr>
<td>Esophageal manometry</td>
<td>Test of choice for the evaluation of esophageal motor function</td>
</tr>
</tbody>
</table>
From the conventional manometry to the high resolution manometry.
Minimum requirements:

1) Recording sites positioned closely enough to allow accurate interpolation of data between sites

2) Three-dimensional plotting methods interpolate between sites and conveniently display the large data set
HIGH RESOLUTION MANOMETRY

Fox MR and Bredenoord AJ. Gut 2008; 57: 405-23
High resolution manometry: segmental peristalsis architecture
• The second pressure segment is well developed before term.

• Presence of other segments improves at term, but peristalsis remains incomplete in nearly half of swallows.

• Control mechanisms for both striated and smooth muscle esophageal regions are incompletely developed in neonates, the outcome of which could participate in infant reflux disease.

“Development of esophageal peristalsis in preterm and term neonates”
HRM was successfully applied to a small number of subjects representing the broad age range seen in paediatrics to examine the appearance of peristalsis.

A segmental oesophageal peristaltic sequence resembling that observed previously in adults was present in all age groups with minimal variation.

### Table 2  Clinical diagnoses and manometric findings

<table>
<thead>
<tr>
<th>Subject group (n)</th>
<th>Final clinical diagnosis (n)</th>
<th>Manometric findings (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neonates (5)</td>
<td>Achalasia (1)</td>
<td>Achalasia pattern (1)</td>
</tr>
<tr>
<td></td>
<td>GORD (3)</td>
<td>Normal (3)</td>
</tr>
<tr>
<td></td>
<td>Functional regurgitation (1)</td>
<td>Normal (1)</td>
</tr>
<tr>
<td>Infants/toddlers (6)</td>
<td>GORD (3)</td>
<td>Hypocontractility (2); normal (1)</td>
</tr>
<tr>
<td></td>
<td>Normal (3)</td>
<td>Normal (3)</td>
</tr>
<tr>
<td>Children (29)</td>
<td>Achalasia (5)</td>
<td>Achalasia pattern (5)</td>
</tr>
<tr>
<td></td>
<td>Functional symptoms (5)</td>
<td>LOS dysfunction (3); NSSD (2); normal (1)</td>
</tr>
<tr>
<td></td>
<td>GORD (11)</td>
<td>NSSD (5); normal (5); aperistalsis/severe hypocontractility (1)</td>
</tr>
<tr>
<td></td>
<td>Normal (8)</td>
<td>Normal (8)</td>
</tr>
</tbody>
</table>

GORD, gastro-oesophageal reflux disease; NSSD, non-specific spastic disorder; LOS, lower oesophageal sphincter.
“Segmental characteristics of esophageal peristalsis in paediatric patients”
“Segmental characteristics of esophageal peristalsis in paediatric patients”
10-lumen catheter

21-lumen catheter
**CONVENTIONAL ESOPHAGEAL MANOMETRY**
Raised baseline LOS pressure. Failed LOS relaxation on swallowing. Aperistalsis

**TOPOGRAPHIC ESOPHAGEAL MANOMETRY**
Peristaltic segments are absent. Isobaric contour stripes spanning the esophageal body that end in a dam effect at the non-relaxing LOS
• **Primary Objective:** to propose and evaluate a standardized esophageal HRM protocol for use in pediatrics

• **Secondary objective:** to propose and validate a new variable in children, the distal contractile integral adjusted for esophageal length (DCIa), which quantifies length, vigor, and persistence of postdeglutitive ressurization in the distal segment

DCIa of patients with peristaltic dysfunction was significantly lower compared with that of patients without peristaltic dysfunction (p < 0.05).
<table>
<thead>
<tr>
<th></th>
<th>Conventional pull-through manometry</th>
<th>Conventional sleeve manometry</th>
<th>High-resolution manometry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>Inexpensive</td>
<td>Inexpensive</td>
<td>Expensive</td>
</tr>
<tr>
<td>Execution</td>
<td>Relatively elaborate and time consuming</td>
<td>Relatively elaborate and time consuming</td>
<td>Relatively simple and fast</td>
</tr>
<tr>
<td>Interpretation</td>
<td>Requires experience</td>
<td>Requires experience</td>
<td>Relatively easy</td>
</tr>
<tr>
<td>Measuring LOS function and relaxation</td>
<td>Limited</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Measuring UOS function and relaxation</td>
<td>No</td>
<td>Limited</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Evaluation of esophageal motor function in clinical practice

C. P. GYAWALI, * A. J. BREDENOORD, † J. L. CONKLIN, ․ M. FOX, § J. E. PANDOLFINO, ¶ J. H. PETERS, ** S. ROMAN, †† A. STAiano ‡‡ & M. F. VAEZI §§