Gastroesophageal reflux in infants with recurrent pneumonia

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Nuanchan Praphal * Supitcha Saengchote *


Thirty infants under 2 years of age with documented recurrent pneumonia were studied for gastroesophageal reflux (GER) by Barium esophagogram (28 patients) radioscintigraphy (19 patients) and 24-hr-pH monitoring (11 patients). Nineteen infants (63%) had shown evidence of GER. By using Chi-square test, Fisher exact test and unpaired T-test to compare the GER and non GER group, the GER group were younger age (6.78 ± 4.58 months VS 10.9 ± 5.99 months), had significant history of choking and poor nutrition status. Peripheral eosinophilia (Eo > 300/mm³) was significantly found in non GER group.

Key words: Gastroesophageal reflux (GER), Recurrent pneumonia, Reactive airway disease (RAD).

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ศึกษาการ Gastroesophageal reflux (GER) ในผู้ป่วยเด็กอายุต่ำกว่า 2 ปี จำนวน 30 ราย ที่เข้ารับการรักษาในโรงพยาบาลจุฬาลงกรณ์ ตั้งแต่ กรกฎาคม 2533 ถึง ธันวาคม 2535 ด้วยโรคปอดทวีมช้า ซึ่งได้รับการวินิจฉัยโดยมีการตรวจดักเติบย้อนหลัง 2 ครั้งขึ้นไปใน 1 ปี โดยการทำ Barium esophogram (28 ราย) Radionuclide milk scanning (19 ราย) และ 24-hour-esophageal pH monitoring (11 ราย) ผลการศึกษาพบว่า GER หันขึ้น 19 ราย (3 ราย มี Barium esophogram ดักเติบย้อนหลัง 10 ราย วินิจฉัยจาก Radionuclide milk scanning และ 7 ราย จาก 24-hour-esophageal pH monitoring) เมื่อเปรียบเทียบกับการดักเติบย้อนหลัง พบว่ามีการเปลี่ยนแปลงเกิดขึ้นที่ GER โดยใช้ Chi-square, Fisher exact และ unpaired T test พบว่ากลุ่มที่พบ GER มีอายุเฉลี่ยน้อยกว่า (6.78 ± 4.58 เดือน VS 10.9 ± 5.99 เดือน) มีภาวะทุกทางการประวัติเต็มมากกว่ากลุ่มที่ไม่พบ GER อย่างมีนัยสำคัญทางสถิติ (p < 0.05) นอกจากนี้ในกลุ่มที่ไม่พบ GER พบว่ามีภาวะ eosinophilia ร่วมด้วยมากกว่า (P < 0.05)

การศึกษานี้สรุปได้ว่า การ GER เป็นภาวะที่พบได้บ่อยอย่างหนึ่งในผู้ป่วยที่เป็นโรคปอดข้ามของเฉพาะบางกลุ่มที่มีประวัติกลับย้อนหลังและมีภาวะทุกทางการประวัติเต็มมากกว่า การตรวจเพื่อวินิจฉัยภาวะบิดย้อนหลังในรายที่สังเกต ควรทำ radionuclide milk scanning และ 24-hour-esophageal pH monitoring เพื่อคืนจากการทำ Barium esophogram ซึ่งจะได้ผลลัพธ์ที่มีชัด
Gastroesophageal reflux has been considered as physiological mechanism in newborn and early infants. Regarding to Carre, pathological reflux occurred in one of 500 normal newborns and 60% of these infants the symptoms will spontaneously improved at 18 months of age and the other 30%, symptoms may last for more than 4 years.

The pathological reflux with result in failure to thrive, anemia and respiratory disorders. The association of GER and respiratory illness were reported from western countries. In Thailand, Limudompor S. and Praphal N. demonstrated GER as the cause of recurrent pneumonia in only 2 from 19 young children (age < 5 years).

Objective

This study is aimed to identify the correlation of GER and recurrent pneumonia in Thai infants and the predictive factors suggested GER in patients as such.

Material and method

The patients with recurrent pneumonia in Department of Pediatrics, Chulalongkorn University Hospital during July 1990 to December 1992 were recruited in the study with inclusion criteria of: age ≤ 2 years, diagnosis of recurrent pneumonia (≥ 2 radiographically documented bronchopulmonary infection in one year) and no other demonstrable causes of pneumonia (cardiovascular abnormalities, bronchopulmonary dysplasia, neuromuscular disorders, cleft palates, congenital or acquired immune defects). Thirty patients (age 2 months - 22 months) were run through complete history taking, physical examination, chest x-ray, CBC, UA, stool exam, blood biochemistry included immunoglobulin level and tuberculin test. After the patients’ respiratory rate returned normal, no signs of respiratory distress were noted, and bronchodilators were taken off at least 24 hours, esophageal function tests included Barium esophagogram (28 patients) radiostinctigraphy (19 patients) and 24-hr-pH monitoring (11 patients) were studied.

Radiostinctigraphy was done by mixing Tc 99m colloid with 120-240 ml milk and by Gamma Camera GER and gastric emptying time would be demonstrated. The 24 hr-pH monitoring was done by placing microcystant tube (antimony tip electrode) at 87% of Naso-Xyphisternum distance above esophageal sphincter. The location of the tube were checked through fluoroscopy. Every infant was accompanied by mother who would record the time and duration of activities such as feedings, sleep or awake, position changes and symptoms of coughing, crying, vomiting, etc.

The reflux parameters studied by Vandeplas including % time with pH < 4.0, episodes longer than 5 minutes ± 2 SD were defined as positive test. The diagnosis of GER was made when one or more positive findings from barium studies, scintigraphy and pH monitoring were demonstrated. The data were statistically analysed by chi-square test, Fisher exact test and unpaired T-test. The predictors with p value < 0.05 were considered significant.

Results

Thirty infants, mean age of 8.3 months (2 months-22 months), were devided into GER group (n=19) and non GER group (n=11). Three from twenty-eight infants were diagnosed as GER by Barium study (10.7%), when ten from nineteen infants (52.6%) were classified by radiostinctigraphy, and seven from eleven infants (63.6%) were found by 24-hr pH monitoring.

Mean age of GER group was significantly lower than non GER group (6.78 ± 4.58 months VS 10.90 ± 5.99 months) but no sex difference.

There were significant history of choking and poor nutritional status in GER group (p < 0.05), but no difference in previous use of mechanical ventilator. (Table 1)

Table 1. Clinical features.

<table>
<thead>
<tr>
<th></th>
<th>GER (n=19)</th>
<th>non GER (n=11)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (mo)</td>
<td>6.78 ± 4.58</td>
<td>10.90 ± 5.99</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Sex (F : M)</td>
<td>15 : 4</td>
<td>8 : 3</td>
<td></td>
</tr>
<tr>
<td>History of ventilator</td>
<td>4 (21.1%)</td>
<td>1 (9.09%)</td>
<td>0.38</td>
</tr>
<tr>
<td>History of choking</td>
<td>10 (52.63%)</td>
<td>1 (9.09%)</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Malnutrition</td>
<td>9 (47.36%)</td>
<td>1 (9.09%)</td>
<td>&lt; 0.05</td>
</tr>
</tbody>
</table>
Considering on factors associated with reactive airway disease (RAD), there were no differences in history of atopy and wheezy child. Peripheral eosinophilia (Eo > 300/mm$^3$) was significantly found in non GER group (Table 2) but no statistical differences in chest x-ray findings. (Table 3)

### Table 2. Factors associated with reactive airway disease (RAD)

<table>
<thead>
<tr>
<th></th>
<th>GER (n=19)</th>
<th>non GER (n=11)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>History of atopy</td>
<td>6(31.18%)</td>
<td>4(36.36%)</td>
<td>1.0</td>
</tr>
<tr>
<td>Wheezing</td>
<td>15(78.95%)</td>
<td>8(72.73%)</td>
<td>1.0</td>
</tr>
<tr>
<td>Eosinophil &gt; 300/mm 3</td>
<td>6(31.58%)</td>
<td>8(72.73%)</td>
<td>&lt; 0.05</td>
</tr>
</tbody>
</table>

### Table 3. Chest x-ray findings.

<table>
<thead>
<tr>
<th></th>
<th>GER (n=19)</th>
<th>non GER (n=11)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyperaeration</td>
<td>6(31.58%)</td>
<td>3(27.27%)</td>
<td>1.0</td>
</tr>
<tr>
<td>Perihilar infiltration</td>
<td>9(47.37%)</td>
<td>5(45.45%)</td>
<td>0.92</td>
</tr>
<tr>
<td>Patchy infiltration</td>
<td>8(42.10%)</td>
<td>5(45.45%)</td>
<td>1.0</td>
</tr>
</tbody>
</table>

### Discussion

Diagnostic methods of GER has been discussed elsewhere (Table 4). In our study we chose any of the 3 diagnostic studies: Barium esophagography, radioncintigraphy and 24-hr-pH monitoring. Nearly all patients were studied with Barium esophagogram to define structural abnormalities such as T-E fistula, vascular ring, etc. 63% of infants with recurrent pneumonia has shown evidence of GER. This prevalence was quite similar to the study from Malfroot although the mean age of Malfroot group was higher (age < 5 years). By Chen, the incidence of GER was 91% which was much higher than ours but Chen recruited the infants with associated diseases eg. cerebral palsy, bronchopulmonary dysplasia, TE fistula, etc.
Table 4. Diagnostic test for GER.

<table>
<thead>
<tr>
<th>Test</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
<th>Advantage</th>
<th>Disadvantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barium esophagogram</td>
<td>40</td>
<td>85</td>
<td>available, demonstrate structural abnormality</td>
<td>not sensitive</td>
</tr>
<tr>
<td>Radioscintigrapy</td>
<td>61</td>
<td>95</td>
<td>non invasive, demonstrate structural abnormality</td>
<td>can't demonstrate</td>
</tr>
<tr>
<td>24-hr-pH monitoring</td>
<td>88</td>
<td>96</td>
<td>sense and specific, can grading severity</td>
<td>long time monitor</td>
</tr>
<tr>
<td>esophageal manometry</td>
<td>58</td>
<td>84</td>
<td>indentify cause of GER</td>
<td>cannot</td>
</tr>
<tr>
<td>endoscopy</td>
<td>68</td>
<td>96</td>
<td>demonstrate esophagitis</td>
<td>use as</td>
</tr>
<tr>
<td>esophageal biopsy</td>
<td>77</td>
<td>91</td>
<td>demonstrate esophagitis</td>
<td>diagnostic test</td>
</tr>
</tbody>
</table>

Gastrointestinal symptoms denoted GER eg. vomiting, choking, regurgitation and hematemesis etc., these were the cause of failure to thrive or malnutrition. In GER group, GER may cause pulmonary wheezing by reflex bronchospasm or microaspiration. In non GER group peripheral eosinophilia was markedly observed.

In conclusion, gastroesophageal reflux may be considered as a cause of recurrent pneumonia in infants with younger age, history of choking and malnutrition. Such predictive factors may help physician selecting the proper investigations in infant with recurrent pneumonia.

References


