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Gastroesophageal reflux in infants with recurrent pneumonia

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Deerojanawong J, Vivatvakin B, Prapphal N, Saengchote S. Gastroesophageal reflux in infants with recurrent pneumonia. Chula Med J 1993 Nov; 37(11) : 685-690

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 ($Eo > 300/mm^3$) was significantly found in non GER group.

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

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จิตลัดดา ศิโรจนวงศ์, บุษบา วิวัฒน์เวคิน, นวลจันทร์ ปราบพาล, สุพิชชา แสงโชติ. การไหลย้อนกลับของสารในกระเพาะอาหารเข้าสู่หลอดอาหารในเด็กเล็กที่เป็นโรคกรดไหลย้อน. จุฬาลงกรณ์เวชสาร 2536 พฤศจิกายน; 37(11) : 685-690

ศึกษาภาวะ Gastroesophageal reflux (GER) ในผู้ป่วยเด็กอายุต่ำกว่า 2 ปี จำนวน 30 ราย ที่เข้ารับการรักษาในโรงพยาบาลจุฬาลงกรณ์ ตั้งแต่ กรกฎาคม 2533 ถึง ธันวาคม 2535 ด้วยโรคกรดไหลย้อนซึ่งได้รับการวินิจฉัยโดยมีภาพรังสีปอดผิดปกติตั้งแต่ 2 ครั้งขึ้นไปใน 1 ปี โดยการทำ Barium esophagogram (28 ราย) Radionuclide milk scanning (19 ราย) และ 24-hour-esophageal pH monitoring (11 ราย) ผลการศึกษาพบภาวะ GER ทั้งสิ้น 19 ราย (3 ราย มี Barium esophagogram ผิดปกติ 10 ราย วินิจฉัยจาก Radionuclide milk scanning และ 7 ราย จาก 24-hour-esophageal pH monitoring) เมื่อเปรียบเทียบลักษณะทางคลินิกประวัติการสำลัก ภาพรังสีปอด และผลตรวจทางห้องปฏิบัติการในผู้ป่วยที่ตรวจพบ GER และผู้ป่วยที่ตรวจไม่พบ GER โดยใช้ Chi-square, Fisher exact และ unpaired T test พบว่ากลุ่มที่พบ GER มีอายุเฉลี่ยน้อยกว่า (6.78 ± 4.58 เดือน VS 10.9 ± 5.99 เดือน) มีภาวะทุพโภชนาการประวัติสำคัญมากกว่ากลุ่มที่ไม่พบ GER อย่างมีนัยสำคัญทางสถิติ ($p < 0.05$) นอกจากนี้ในกลุ่มที่ไม่พบ GER พบว่ามีภาวะ eosinophilia ร่วมด้วยมากกว่า ($P < 0.05$)

การศึกษานี้สรุปได้ว่า ภาวะ GER เป็นภาวะที่พบได้บ่อยอย่างหนึ่งในผู้ป่วยที่เป็นโรคกรดไหลย้อน โดยเฉพาะในเด็กที่มีประวัติสำคัญบ่อยและมีภาวะทุพโภชนาการร่วมด้วย การตรวจเพื่อยืนยันการวินิจฉัยในรายที่สงสัย ควรทำ radionuclide milk scanning และ 24-hour-esophageal pH monitoring เพิ่มเติมจากการทำ Barium esophagogram ซึ่งจะได้ผลบวกเพิ่มขึ้น

Gastroesophageal reflux has been considered as physiological mechanism in newborn and early infants. Regards to Carre, ⁽¹⁾ 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. ⁽¹⁻⁴⁾ The association of GER and respiratory illness were reported from western countries. ⁽⁵⁻¹⁸⁾ In Thailand, Limudompor S. and Prapphal N. demonstrated GER as the cause of recurrent pneumonia in only 2 from 19 young children (age < 5 years). ⁽¹⁹⁾

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 \leq 2 years, diagnosis of recurrent pneumonia (\geq 2 radiographically documented bronchopulmonary infection in one year) ⁽²⁰⁾ 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) radiosintigraphy (19 patients) and 24-hr-pH monitoring (11 patients) were studied.

Radiosintigraphy 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 microcrysant 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 Vandeplass ⁽²¹⁾ including % time with pH < 4.0, episodes longer than 5 minutes \geq + 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 divided 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 radiosintigraphy, 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 \pm 4.58 months VS 10.90 \pm 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.

	GER (n=19)	non GER (n=11)	P value
Age (mo)	6.78 + 4.58	10.90 + 5.99	< 0.05
Sex (F : M)	15 : 4	8 : 3	
History of ventilator	4 (21.1%)	1 (9.09%)	0.38
History of choking	10 (52.63%)	1 (9.09%)	< 0.05
Malnutrition	9 (47.36%)	1 (9.09%)	< 0.05

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)

	GER (n=19)	non GER (n=11)	P value
History of atopy	6(31.18%)	4(36.36%)	1.0
Wheezing	15(78.95%)	8(72.73%)	1.0
Eosinophil > 300/mm ³	6(31.58%)	8(72.73%)	< 0.05

Table 3. Chest x-ray findings.

	GER (n=19)	non GER (n=11)	P value
Hyperaeration	6(31.58%)	3(27.27%)	1.0
Perihilar infiltration	9(47.37%)	5(45.45%)	0.92
Patchy infiltration	8(42.10%)	5(45.45%)	1.0

Discussion

Diagnostic methods of GER has been discussed elsewhere (Table 4).^(3,4,22-27) In our study we choosed any of the 3 diagnostic studies : Barium esophagography, radiosintigraphy and 24-hr-pH monitoring. Nearly all patients were studied with Barium esophagogram to define structural abnormalities such as T-E fistula, vascu-

lar 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⁽¹⁵⁾ (age < 5 years). By Chen,⁽²⁸⁾ 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.

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

Gastrointestinal symptoms denoted GER eg. vomiting, choking, regurgitation and hematemesis etc., these were the cause of failure to thrive or malnutrition. (2-4,22-27) In GER group, GER may cause pulmonary wheezing by reflex bronchospasm or microaspiration. (2,3,23,25) 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.

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