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THE INCIDENCE OF GASTROESOPHAGEAL REFLUX IN AWAKE, ASLEEP, POSTCIBAL AND FASTED PERIODS IN ASYMPTOMATIC AND SYMPTOMATIC INFANTS. Yvan Vandenplas, Academic Children's Hospital Free University of Brussels, BELGIUM.

Extended esophageal pH monitoring is probably the most accurate technique for evaluating gastroesophageal reflux (GER), and is eminently suitable to study the influence of different factors such as age, position and drugs on the incidence of GER.

Using pH monitoring, we examined 30 asymptomatic (15 were 1.5-2.5 months old; 15 were 2.5-4.5 months old) and 38 symptomatic infants (1.5-4.5 months old) for GER. The occurrence of GER was analysed in different periods of interest: awake (Aw), asleep (As), fasted (F) and postcibal (PC) periods. In the symptomatic infants a 2nd pH monitoring was performed after 13-16 days of cisapride administration (0.2mg/kg/day) (22 were studied in an open study, 16 were studied according to a double-blind protocol).

The increasing incidence of GER we reported previously in asympt. infants according to their age, appeared to be almost due to an increased occurrence in the Aw (and PC) periods. Asympt. infants rarely reflux during sleep. In sympt. infants the increase was most prominent during the As-(F) periods as far as the reflux index, the duration of the longest reflux ep., and the n° of reflux ep. >5min are concerned. The n° of reflux ep. increased most in the PC periods. Cisapride was very effective (P<0.001) regarding the total invest. Parameters normalized in the Aw periods, but differences were largest in the As and F periods.

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GASTRO-ESOPHAGEAL REFLUX IN THE PRE-TERM INFANT  
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As the incidence, severity, and natural history of gastro-oesophageal reflux (GOR) in preterm infants is unknown we have studied GOR in this population. Continuous intraoesophageal pH was monitored over 24 hours using a novel 1mm antimony pH electrode (Synectics Medical). Electrode position was determined following identification of the lower oesophageal sphincter (LOS) by manometry and the LOS pressure (LOSP) measured.

51 measurements were made on 29 patients (post-conceptual age (PCA): median 31, range 26-39 weeks). Mean ( $\pm$  SEM) indices of GOR were as follows: 12.1  $\pm$  2 episodes of GOR per 24 h; pH was  $\leq$  4 for 4%  $\pm$  0.9% of the total time; the longest episode during each recording was 17  $\pm$  4.6 min.

The effect of various events upon GOR was assessed by analysing the amount of GOR occurring during a 30 min period including and following that event. This was compared with GOR during periods of rest. GOR was most likely to occur at the time of physiotherapy, oropharyngeal suction, and nappy change (each p<0.001), and was increased after feeds (0.05 (p<0.1)). Reflux was slightly increased in the left lateral position compared with right lateral and prone positions, but this was not significant. There was no correlation between GOR and PCA, gestation, or LOSP. Infants receiving xanthine for apnoea had a twofold increase in GOR (p<0.05). A subgroup of six infants with recurrent apnoea unresponsive to xanthine had markedly higher mean GOR indices than all other infants studied (p<0.001). A rapid reduction in the frequency of apnoea followed abolition of GOR with thickened feeds.

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DOES VENTILATION PRECIPITATE GASTRO-ESOPHAGEAL REFLUX IN ENTERALLY FED VERY LOW BIRTHWEIGHT BABIES?  
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The early introduction of milk to preterm infants has many theoretical advantages. However, enteral feeding is considered by some to be contra-indicated in ventilated infants because of fear of gastro-oesophageal reflux (GOR). We have therefore investigated this practice by monitoring GOR in six very low birth weight infants, of post-conceptual age 26-32 weeks.

Each infant was studied twice, once during ventilation and once while breathing spontaneously in headbox oxygen. All received expressed breast milk as hourly nasogastric bolus feeds at 120-180 ml/kg/day, throughout the study. A 1mm pH electrode (Synectics Medical) was positioned 1-2cm above the lower oesophageal sphincter following identification of the sphincter by manometry. Resting pressures in lower oesophageal sphincter and body did not differ significantly during ventilation. Intra-oesophageal pH was monitored continuously over 24 hours and standard indices of GOR calculated:

GOR indices	number of episodes	episodes >5min	% time pH <4
per 24h			
IPFV	8.2	1.2	1.4
No IPFV	21.3	5.0	6.7

In all patients reflux indices were less during ventilation. Feeds were well tolerated and no child suffered deterioration attributable to aspiration pneumonia.

Early enteral nutritional support for very low birth weight infants may therefore be provided without increased risk of aspiration.

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24 H INTRA-ESOPHAGEAL PH MONITORING IN NEAR MISS SUDDEN INFANT DEATH SYNDROME (NMSID).  
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From 1/34 to 3/86 130 infants were referred because of an event of prolonged apnea, hypotonia and cyanosis or pallor. The study protocol consisted in a night polygraphic recording (P.R.). A metabolic, neurological, toxicological, gastrointestinal and cardiological work up.

Gastroesophageal reflux was suspected in 73/130 patients. In 48 patients 24-h intra esophageal pH monitoring was performed simultaneously with polygraphic recording. In 33/48 patients an overt peptic GER was found:

N=33	infant seat	supine	prone
total N reflux	10+9,2	4,61+4,03	2,72+2,76
N reflux > 5 min	1,5+1,65	1,27+1,41	1,0+1,45
longest reflux (!)	11,8+13	16,1+20,2	24,1+67,3
%time pH < 4	8,1+8,4	7,95+9,17	8,48+18,71

An abnormal P.R. was observed in 8/33 GER patients (24,2%).

Conclusion: severe GER was objectivated in 33/130 (25%) of patients with NMSID. This was the most frequent pathological association found.

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THE 24-HOUR INTRAESOPHAGEAL pH MONITORING: A CRITICAL REASSESSMENT. S.Cucchiara, L.Gobio Casali, A.Staiano, L.Greco, G.De Luca. Clinical Pediatrics, University Naples, Dept Pediatrics, Hospital of Mantova, Italy.

We evaluated the ability of 24-h intraesophageal pH monitoring in discriminating 78 patients (pts) with gastroesophageal reflux (GER) disease (GERD) from 22 controls (Cpts): 17 pts had GERD alone (Apts) and 61 GERD and esophagitis diagnosed by endoscopy and biopsy (Bpts). Mean ( $\pm$ SD) age (months) was 30.0  $\pm$  34.7 (A), 50.1  $\pm$  53.8 (B), 19.3  $\pm$  29.1 (C). Total exposure acid time (% GER) (A: 5.4  $\pm$  2.9; B: 9.0  $\pm$  9.9, p<0.05; C: 1.1  $\pm$  0.7, p<0.001 vs A and B; mean  $\pm$  SD) and the number of GER episodes >5' to clear (A: 3.3  $\pm$  2.9; B: 5.7  $\pm$  5.5, p<0.05; C: 0.4  $\pm$  0.7, p<0.001 vs A and B; mean  $\pm$  SD) were the variables most consistently abnormal in pts. The Bpts differed from Apts both for % GER and GER episodes >5' in the early post-cibal period (pcp) (respectively: 3.9  $\pm$  5.1% vs 2.1  $\pm$  1.9%, p<0.05, and 2.7  $\pm$  3.3 vs 1.4  $\pm$  1.8, p<0.05; mean  $\pm$  SD) but not in the late pcp or during the sleep. Normal values (<2 SD from controls) for acid exposure time were found in 23.5% of Apts and 26.2% of Bpts and for GER episodes >5' in 47.1% of Apts and 41.0% of Bpts. We conclude that: 1) Acid reflux in the early pcp plays a role in the development of mucosal injury; 2) the 24-h intraesophageal pH test has a remarkable incidence of negative results that limit its sensitivity.

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DISORDERED OESOPHAGEAL MOTOR ACTIVITY IN GASTRO-ESOPHAGEAL REFLUX.  
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Castro-oesophageal reflux (GOR) occurs frequently in young children and whilst in some is trivial, in others the consequences may be life threatening. The cause of the different clinical patterns may be related to the underlying motor events. We studied swallow induced motor activity of the oesophageal body and lower sphincter and intra-oesophageal pH in controls (C n=9), infants with GOR without oesophagitis (R n=12) and in GOR with oesophagitis (RO n=5) using a constantly perfused multi-lumen catheter with distal sleeve and intraluminal pH probe. Basal lower oesophageal sphincter pressure (LOSP) in C was 22.9  $\pm$  3.9 mmHg (mean  $\pm$  SD), in R 21.8  $\pm$  11.2 and RO 14.6  $\pm$  5.5 (p<0.01). The mean amplitude of oesophageal peristaltic waves was C 17.6  $\pm$  15.8, R 50.4  $\pm$  23.2 and RO 15.8  $\pm$  7.9 mmHg (p<0.01). The waveforms in RO only were bizarre and polyphasic. 77 episodes of reflux in GOR were detected 51 (79%) were synchronous with swallowing and 16 (21%) were asynchronous with swallowing, and in these clearance of refluxed acid was longer than in those with synchronous reflux (1.58  $\pm$  1.49 vs 0.75  $\pm$  0.45 min). Asynchronous reflux occurred almost exclusively in those with severe feeding problems or complicated reflux. This study shows that a variety of mechanisms may cause GOR. Decreased basal LOSP occurred in RO. The motor pattern in RO suggests a neuropathic aetiology. Infants with GOR and trivial symptoms had GOR synchronous with swallowing whereas those with serious symptoms had slower acid clearance and asynchronous reflux. We suggest that the former is an exaggerated physiological response and that the latter may be related to intrinsic pathology of the motor apparatus.