

medium around the IEI electrodes. Gastroesophageal reflux provokes a drop in impedance which returns to baseline values after esophageal clearance. We aimed to study the influence of Barrett's mucosa or esophagitis on baseline IEI values and on recognition of acid reflux episodes. Methods: A slow pullthrough of a manometric-IEI assembly across the gastroesophageal junction followed by a 2-hr postprandial recording was performed in 14 healthy controls (24 yr, range 20-29 yr), 9 patients with erosive esophagitis (45 yr, range 29-69 yr) and 12 patients with Barrett's esophagus (58.5 yr, range 43-73 yr). Results: Baseline IEI values at the LES were significantly reduced in patients with Barrett's (Table). The columnar lined esophageal mucosa had significantly lower IEI than squamous mucosa, and the length of Barrett's mucosa determined by IEI correlated significantly ($r=0.66$, $p=0.03$) with that determined endoscopically. Recognition of acid reflux was possible when baseline IEI in the distal esophagus was higher than 800k Ω . Conclusions 1) In patients with Barrett's esophagus, IEI is significantly reduced at both the LES and in the columnar lined segment of the esophageal body. The values at the LES may reflect lower LES pressure, thereby increasing cross-sectional area or altering mucosal contact with the electrodes. The values in the esophageal body may be related to differences in pH profile or trans-mucosal potential difference. 2) Whilst the low values did not obscure recognition of reflux, low basal IEI values must be taken into account when interpreting IEI recordings in patients with Barrett's esophagus

	FUNDUS	LES	ESOPHAGUS	
			columnar	squamous
normal	471(377-566)	1877(1555-4844)		2227(1950-3880)
GERD	499(373-624)	1249(837-2181)*		2158(1787-2604)
Barret	492(373-624)	640(530-858)*#	1050(825-1358)*	2045(1338-2713)

* $p<0.05$ vs. normal; # $p<0.05$ vs. GERD; ** $p<0.05$ vs. squamous

2635

LONG-TERM OUTCOME OF MEDICAL AND SURGICAL THERAPIES FOR GERD: EFFECTS ON SURVIVAL.

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Background: From July 1986 through November 1989, the Department of Veterans Affairs conducted a multicenter, prospective, randomized trial of medical and surgical antireflux therapies for 248 patients with complicated GERD (N Engl J Med 1992;326:786). We have done a follow-up study of this well-defined cohort to explore the long-term influence of GERD therapies on survival. Methods: Surviving patients were contacted and invited to participate in the follow-up study. For patients who had died, we obtained information regarding cause of death from autopsy results, hospital records, and death certificates. We also obtained information regarding the development of esophageal cancer in all patients, living and dead. Results: With the help of a professional search agency, the whereabouts of 240 (97%) of the original 248 patients were determined. At the time of randomization, the mean age of patients in both groups was 58 years; their mean age now is 70 years. There were 79 deaths that involved 33 (40%) of the 82 patients randomized to the surgical group, and 46 (28%) of the 166 patients randomized to receive medical treatment. In an intention-to-treat analysis, survival over an 11 to 13 year period was found to be significantly decreased in the surgical group ($P=0.047$, RR 1.58, 95% CI 1.01 to 2.48, Cox proportional hazards model). In the original study, 24 of the 82 patients randomized to surgery and 16 of the 166 patients randomized to medical therapy decided not to participate in the trial before they received their assigned treatments. When the survival analysis was limited to patients who actually received the treatments to which they were assigned, the survival differences were even greater and more significant despite the smaller sample size ($P=0.026$, RR 1.74, 95% CI 1.07 to 2.84). The percentage of all deaths due to all cancers, cardiac, and pulmonary diseases were similar for the two groups. Four patients in the medical group developed adenocarcinoma of the esophagus, whereas no patient in the surgical group developed this cancer (NS). Conclusions: During a follow-up period of 11 to 13 years, survival was significantly decreased (by 58%) for patients with complicated GERD who were treated with fundoplication compared to medically-treated patients. The shortened survival occurred despite a lower incidence of esophageal adenocarcinoma in the surgical group. Overall causes of death between the two groups did not differ significantly, and the mechanism underlying the decreased survival in surgical patients is not clear.

2636

MULTICHANNEL INTRALUMINAL IMPEDANCE (MII): A HIGHLY SENSITIVE TECHNIQUE TO DETECT SMALL INTRA-ESOPHAGEAL VOLUMES.

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Introduction: MII is a new technique that has been used to evaluate bolus transport and GE reflux, however, its sensitivity to detect varying bolus types and volumes has not been assessed. Aim: To determine the threshold volume at which an impedance change occurs with liquid, semi-solid, and solid boluses. Methods: Ten healthy subjects had the impedance probe placed transnasally with the 2cm recording segments located at 2, 4, 6, 8, 14, and 20 cm above the LES. Swallows were tested with 1, 5, 10, and 20ml of pH2, pH8, ice, and 130F water and 1, 2, 3, 4, 5, 10, and 20ml of applesauce and sterile water (pH5) and also 3 different size marshmallows, 3 dry swallows and 3 dry swallows after oral aspiration (dry, dry swallows). Type of bolus administered was randomized for each subject. Average percentage decrease of impedance from baseline in the distal 4 segments was calculated for each swallow. Results: There was no difference in impedance changes with 1 thru 10ml volumes of sterile water or apple sauce, but dry-dry swallow produced smaller impedance change than 1ml water (33.4 ± 3.7 vs $50.3\pm1.6\%$; $p<0.01$). Marshmallow did not produce any significant differences at small ($51.5\pm3.3\%$) medium ($60.4\pm2.8\%$) and large ($58.9\pm2.7\%$) sizes. At 5ml, % decrease in impedance with pH2 water (64.0 ± 2.3) was significantly ($p<.05$) larger than pH5 (46.4 ± 2.5), pH8 (42.8 ± 1.8), ice water (37.4 ± 3.2), 130F water (44.5 ± 2.6), and applesauce (49.9 ± 2.1). Summary: MII is very sensitive to measurement of small volumes, with a threshold less than 1 ml. Impedance drops due to acid are significantly larger than with other pHs. Once a threshold is met, no further impedance drops occur with progressively larger boluses. Conclusion: Multichannel intraluminal impedance detects small volumes of intraesophageal substances. It does not accurately assess volume differences.

2637

AUTOMATED PROCEDURE FOR THE DETECTION OF GASTROESOPHAGEAL REFLUX IN MULTIPLE INTRALUMINAL IMPEDANCE RECORDINGS.

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It has been shown previously that the multiple intraluminal impedance (IMP) measurement allows the detailed analysis of esophageal transports including the detection of gastroesophageal reflux (GER) independent of its pH. So far, the application of the IMP technique was limited by the time-consuming visual analysis of the IMP traces. Therefore, a Neuro-Fuzzy pattern recognition system for the automatic detection of GER in the IMP measurements was developed. This study aims at the validation of the computer-assisted detection of GER with regard to the achieved quality and its clinical use. Methods: The study is based on 10 investigations performed in infants with clinical evidence of GER. The IMP recordings were evaluated by multiple visual analysis carried out by several experts. The adjusted results of all experts are taken as reference. 442 GER are identified in 60 hours of measurement. The validation of the computer-assisted analysis is performed by the comparison of an automatic analysis followed by a visual control and the results of a single visual evaluation of the IMP traces. Results: The mean sensitivity for the detection of GER achieved by a single visual evaluation is ($71\pm11\%$), the positive prediction is ($71\pm14\%$), the evaluation time is about 2h 50min. The automatic pattern recognition system detects ($79\pm11\%$) of the reflux episodes in combination with a positive prediction of ($58\pm17\%$). After the visual control of these automatically detected episodes the result of the evaluation showed a mean sensitivity of ($74\pm2\%$) and a positive prediction of ($77\pm4\%$). The visual control of the detected events needed 17 minutes in the mean. Conclusions: In comparison to a single visual evaluation, the computer-assisted procedure realizes a slightly increased detection rate and a reduced number of false alarms. Additionally the standard deviation of the results of the different experts decreases so that the detection rate becomes less dependent on the experts experience and concentration and therefore objectifies the results. The mean evaluation time is reduced significantly. In conclusion the use of the automated detection of GER in IMP measurements leads to a standardized result and the quality is equivalent to a single visual analysis. Due to the considerable acceleration of the evaluation the applicability of the IMP technique is enhanced significantly.