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Twelve hour overnight oesophageal pH monitoring in patients with reflux symptoms

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Abstract

Results of continuous 12 hour overnight pH monitoring (duration of pH<4) were reviewed in 112 patients with heartburn or regurgitation, or both, and in 56 normal subjects. Patients had more reflux than normal subjects. Medically controlled patients (n=51) had less acid reflux than patients who subsequently underwent reflux surgery (n=61), but there was a considerable overlap between those two groups. Surgery was followed by a reduction in acid reflux to a value similar to that in normal subjects. Patients in whom surgery was deemed to have failed had more reflux after the operation than those in whom it was successful, but no difference could be found in the preoperative reflux values of these two subgroups. Monitoring pH is not of value in selecting candidates for surgery since the results are not a good predictor of outcome, but it is useful in the objective evaluation of surgical results.

It has been claimed that continuous 12 to 24 hour intraoesophageal pH monitoring is the best way to quantitate gastro-oesophageal acid reflux.[1-3] There is a close relation between the results of continuous pH monitoring on the one hand and symptoms of reflux and endoscopic oesophagitis on the other.[4,5] There has, however, been no evaluation of the results of continuous pH monitoring in relation to outcome of reflux surgery, although the method is widely used.[6-9]

We have reviewed our results for continuous 12 hour overnight pH monitoring and compared these with the clinical selection of candidates for surgery. We used results of preoperative monitoring retrospectively to try to predict the outcome of surgery. Pre- and postoperative values were used to evaluate the success of surgery and to determine whether these could be helpful in selecting the surgical procedure.

Methods

The study population consisted of 112 patients with symptoms of gastro-oesophageal reflux (heartburn, regurgitation, or both) and 56 normal subjects without gastrointestinal symptoms (Table I). None of the normal subjects had undergone any abdominal surgery other than appendectomy. Sixty one of the patients with symptoms had surgery (surgical group), either a Belsey MKIV repair or Angelchik prosthesis (Table I). The decision to undertake surgery was mainly based on clinical criteria and in 26 patients also on the endoscopic appearance of the oesophageal mucosa. The main clinical criteria for surgery were lack of symptomatic relief with standard medications (mainly H_2 receptor-blockers) together with a non-pharmacological regimen.[10,11] In 51 patients medical treatment was sufficient and surgery was not therefore indicated (non-surgical group). These patients were followed for up to 15 years (median 9 years) after first presentation at the clinic and none had subsequent reflux surgery.

The age and sex distributions of the subjects are set out in Table II.

All subjects underwent 12 hour overnight pH monitoring as has been described.[12] The results were analysed automatically and the duration of an oesophageal pH<4 as percentage of the 12 hour recording was used as the variable.[1] The result of pH monitoring was not available to the clinician who decided on medical or surgical treatment.

Patients who underwent surgery were also investigated three months after the operation or later if they had recurrent reflux symptoms.

TABLE I *Patients in the different study groups*

	Patients	*Control subjects*
No	112	56
Total undergoing surgery	61	–
Belsey MK IV	43	–
Angelchik	18	–
Medically controlled	51	–

TABLE II *Age and sex distributions of patients and normal subjects*

			Sex
Group	*Median age (yrs)*	*Range (yrs)*	*F/M*
Surgical group	59·4	26–79	28/33
Non-surgical group	57·8	28–77	23/28
Normal subjects	26·5	18–56	28/28

TABLE III *Results of 12 hour continuous pH monitoring*

	Duration of pH<4 (%)		
Group	*No*	*Median*	*Range*
Surgical group	61	10·00	0–100
Non-surgical group	51	5·80	0–80·74
Normal subjects	56	0·07	0–2·91

Surgical *v* non-surgical group (p<0·02). Normal subjects *v* surgical group and *v* non-surgical group (p<0·0001).

TABLE IV *Results of pH monitoring before and after reflux surgery*

	Duration of pH<4 (%)		
Group	*No*	*Median*	*Range*
Before surgery	61	10·00	0–100
After surgery	61	0·17	0–66·00
Normal subjects	56	0·07	0–2·91

A significant reduction in acid reflux is found after surgery (p<0·0001) and no difference is found between normal subjects and patients after surgery.

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TABLE V *Results of 12 hour pH monitoring in relation to operative procedure*

	Duration of pH<4 (%) (median (range))		
Procedure	*No*	*Before surgery*	*After surgery*
Belsey	43	7·99 (0–85)	0·1 (0–66)
Angelchik	18	14·00 (0–100)	1·0 (0–27)

Belsey *v* Angelchik: NS. Before *v* after surgery: p<0·0001.

TABLE VI *Clinical results in relation to surgical procedure*

	No with reflux symptoms	
Procedure	*Before surgery*	*After surgery*
Belsey	43	5
Angelchik	18	1

NS.

TABLE VII *Results of 12 hour pH monitoring before and after surgery in patients with and without reflux symptoms after surgery*

	Duration of pH<4 (%) (median (range))	
	Before surgery	*After surgery*
Reflux symptoms after surgery	7·58 (4–34·66)	26·00 (7·91–66·00)
No reflux symptoms after surgery	10·48 (0–100)	0·05 (0–27)

No difference between preoperative results. Patients with reflux symptoms after surgery have more reflux than patients without symptoms (p<0·05).

STATISTICS

The Mann-Whitney two sample rank sum test, Wilcoxon's test for paired comparisons, and Spearman's rho were used for statistical evaluation. P values of less than 0·05 were accepted as significant.

Results

Patients with symptoms of gastro-oesophageal reflux had a pH<4 for longer than normal subjects, and there was also a difference between the surgical and the non-surgical groups (Table III).

There was no correlation between age and the results of the pH monitoring in the whole study group and no correlation was found for either of the subgroups.

A significant reduction in acid reflux was found after surgery, irrespective of the surgical method (Table IV), and after surgery no difference was found between the values of normal subjects and of patients (Table IV).

The results in relation to surgical procedure are given in Table V. The clinical results are similar for the two different surgical procedures. Nor do the results of the pH monitoring before and after surgery differ in the two surgical subgroups (Tables V and VI).

Patients whose symptoms persisted after surgery had more reflux than those who were symptom free, but the preoperative results in these patients did not differ from each other (Table VII).

Discussion

We found that the results of 12 hour overnight pH monitoring in patients with heartburn or regurgitation, or both, can be used to confirm that the symptoms are caused by acid reflux. Furthermore, patients who responded to medical treatment had less acid reflux than those who did not and subsequently underwent surgery. A considerable overlap between these two groups, however, means that pH monitoring cannot be used as an indication for surgery in a single patient.

In a comparable group of surgical candidates the clinical effect of the two different surgical procedures was not different, nor did the results of pH monitoring differ.

The age distribution of patients and normal subjects is different, but no correlation between age and the results of pH monitoring could be found.

The greatest problem for the clinician is to select the right candidates for surgical treatment of severe reflux disease. Our results indicate that pH monitoring is of little help in overcoming this problem as preoperative values did not differ between patients who benefited from surgery and those who did not.

pH monitoring has been used to evaluate surgical results,[6-9] and we found that reflux surgery was followed by a reduction in acid reflux. This non-randomised study did not allow us to draw conclusions about the choice of surgical procedure, but strict criteria were used to select the patients for surgery and we did not find any difference between the two surgical methods. Poor surgical results could be confirmed by pH monitoring but not predicted.

pH monitoring is not of value in selecting candidates for surgery, in predicting the results of surgery, or in choosing the surgical procedure, but it is useful in the objective evaluation of surgical results.

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