

Illness behavior and laparoscopic antireflux surgery: tailoring the wrap to suit the patient

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SUMMARY. Psychological factors are believed to play a role in gastroesophageal reflux disease. It has previously been shown that preoperative illness behavior influences the outcome after laparoscopic Nissen fundoplication. Between August 2001 and June 2004 we considered a partly subjective assessment of illness behavior when selecting patients with gastroesophageal reflux disease for laparoscopic anterior partial ($n = 77$) or total fundoplication ($n = 90$). A prospective questionnaire study of illness behavior was also undertaken and the results were correlated with clinical follow up after 12 months. There was a statistically significant difference in age ($P < 0.001$), primary esophageal peristalsis on manometry ($P = 0.037$) and two illness behavior category scores related to hypochondriasis ($P = 0.041$ and $P = 0.025$) between laparoscopic anterior partial fundoplication and Nissen total fundoplication groups. Despite these differences, there was no significant correlation between preoperative illness behavior score and patient satisfaction in either group. There was a statistically significant negative correlation between the ability to express personal feelings and postoperative heartburn score in those who had a laparoscopic anterior partial fundoplication ($P = 0.048$). The clinical outcome in both groups was good to excellent in terms of postoperative heartburn and satisfaction scores. A tailored approach in the choice of wrap, taking into account psychological factors preoperatively, is an appropriate strategy for laparoscopic fundoplication.

KEY WORDS: fundoplication, gastroesophageal reflux, health behavior, hypochondriasis, treatment outcome.

INTRODUCTION

Laparoscopic fundoplication has become established as the surgical treatment of choice for gastroesophageal reflux disease and is associated with good to excellent symptom control, quality of life and patient satisfaction.^{1–3} Several modifications to the traditional 360° wrap or Nissen total fundoplication have been introduced to reduce some of the unwanted effects of surgery such as dysphagia and gas bloat.^{4,5} The anterior 90° and 180° laparoscopic partial fundoplications are associated with a low incidence of side-effects and a satisfactory outcome.^{4,5}

Several non-surgical variables affect outcome after laparoscopic fundoplication. For example, a positive correlation of symptom response to proton pump inhibitors, male gender and high socioeconomic status are all associated with increased patient satisfaction.^{2,6}

It has been documented previously that psychological factors such as anxiety and depression may play a role in the symptoms of gastroesophageal reflux disease.^{7,8} We have demonstrated previously that aspects of preoperative illness behavior such as evidence of hypochondriasis or an affective state are correlated with a poor satisfaction after laparoscopic Nissen fundoplication.⁹ Thus it is possible that the outcome of laparoscopic fundoplication might be improved by taking preoperative illness behavior into consideration.

In this study we examined the effect on outcome of using our subjective assessment of illness behavior to select an appropriate wrap for the patient undergoing laparoscopic fundoplication.

PATIENTS AND METHODS

Reflux patients

Between August 2001 and June 2004, 172 patients agreed to undergo primary laparoscopic antireflux surgery on the basis of clinical and physiological

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evidence of gastroesophageal reflux disease. Based on our previous work investigating the influence of preoperative illness behavior on outcome,⁷ we had adopted a practice of recommending a laparoscopic anterior partial fundoplication to patients regarded as overly anxious individuals and as well to patients who were particularly concerned about the side-effects of surgery such as 'wind' problems or dysphagia. Patients were otherwise recommended a laparoscopic Nissen fundoplication.

When patients attended the Royal Adelaide Hospital (Adelaide, Australia) for esophageal pH and manometry studies¹⁰ they were invited to complete an illness behavior questionnaire after giving informed consent. Subsequently, two patients refused to complete the questionnaire and three were unable to do so due to disability. Allowing for this, prospective data were obtained for 167 cases: 77 patients had a laparoscopic anterior partial fundoplication and 90 underwent a laparoscopic Nissen total fundoplication. The surgeon was unaware of the results of the illness behavior survey either pre- or postoperatively. The laparoscopic antireflux operations were performed as previously described.³⁻⁵

Illness behavior questionnaire

We objectively measured illness behavior using a questionnaire described by Pilowsky and Spence¹¹ that had been employed previously to investigate patients with reflux disease^{7,12} and has been used by others to investigate patients undergoing open surgery.¹³ The scores obtained from 62 'yes' or 'no' questions were used to calculate seven categories of illness behavior.

'General hypochondriasis' refers to having a phobic state about one's health. 'Disease conviction' reflects a belief that a physical disease is responsible for symptoms. 'Psychological versus somatic perception' scores high if a person feels that their symptoms are psychological in origin rather than purely physical (somatization). 'Affective inhibition' scores high if someone has difficulty expressing personal feelings (especially negative ones) whereas 'affective disturbance' refers to feeling low in mood. Higher scores

in 'denial' are associated with inability to accept stress as a contributing factor in illness and feelings of anger are manifested in 'irritability' score. In addition, a more general measure of phobic behavior, the 'Whitely index of hypochondriasis' was derived from the answers to 14 of the 62 questions and was originally designed to separate hypochondriacal psychiatric patients from non-hypochondriacal psychiatric patients.¹¹ Two further second order factors, 'affective state' and 'disease affirmation' derived from other scores provided additional measures of general aspects of illness behavior.¹¹ Not all of the 62 illness behavior questions contributed to the illness behavior scores and therefore it was not necessary for every question to be answered.

Regular clinical follow-up of laparoscopic fundoplication patients was routinely performed by research trial assistants using a standardized questionnaire incorporating visual analog scales (range 0-10) for symptoms including heartburn and dysphagia. Satisfaction with the operation was scored from 0 (the least) to 10 for the most satisfied. The trial assistants that obtained follow-up data were blinded to the results of the illness behavior questionnaire and the type of fundoplication performed. We evaluated the clinical outcome at approximately 12 months following surgery.

Statistical analysis

Data was analyzed using SPSS[®] Version 10 for Macintosh (Chicago, Illinois, USA). Preoperative parametric and non-parametric variables were compared using independent values *t*-test and Mann-Whitney *U*-test, respectively. Categorical variables were compared using Chi-square test. The comparison of pre- and postoperative symptom scores was made using the Wilcoxon test. Correlation of surgical outcome with illness behavior score was determined using the Spearman coefficient.

RESULTS

Table 1 shows the preoperative characteristics of the laparoscopic anterior partial and Nissen

Table 1 Pre-operative clinical characteristics of the laparoscopic antireflux surgery groups

Clinical characteristic	Anterior partial (<i>n</i> = 77)	Nissen total (<i>n</i> = 90)	<i>P</i> -value†
Age (year)	55.1 (52.1, 58.1)	46.6 (43.6, 49.5)	< 0.001‡
Male : female ratio	42: 35	46: 44	0.658§
Weight (kg)	86.5 (81.5, 91.6)	84.7 (79.8, 89.7)	0.582
Symptom duration (year)	8.6 (6.6, 10.6)	7.0 (5.2, 8.8)	0.097
Endoscopic esophagitis grade	1.9 (1.5, 2.3)	1.9 (1.6, 2.3)	0.924
% of esophageal primary peristalsis	79.9 (73.1, 86.7)	89.2 (85.0, 93.3)	0.037
Lower esophageal resting pressure (mmHg)	10.4 (8.1, 12.7)	9.4 (7.4, 11.4)	0.534
% of time pH < 4.0 per 24 h	11.9 (8.7, 15.2)	13.9 (10.3, 17.5)	0.674

Values shown are mean (95% confidence interval) or numbers of cases. †*P*-values were calculated by ‡*t*-test, § χ^2 or Mann-Whitney *U*-test.

Table 2 Comparison of preoperative illness behavior category scores between the laparoscopic antireflux surgery groups

Illness behavior category	n†	Anterior partial	n†	Nissen total	P-value
General hypochondriasis	76	1.2 (0.8, 1.6)	87	0.7 (0.4, 0.9)	0.041
Disease conviction	75	2.8 (2.5, 3.2)	85	3.0 (2.7, 3.4)	0.429
Psychological versus somatic perception	77	1.3 (1.1, 1.5)	86	1.3 (1.1, 1.5)	0.969
Affective inhibition	76	2.3 (2.0, 2.7)	88	1.9 (1.6, 2.3)	0.114
Affective disturbance	77	1.9 (1.5, 2.3)	87	1.4 (1.1, 1.8)	0.204
Denial	74	3.5 (3.2, 3.9)	89	3.7 (3.3, 4.0)	0.509
Irritability	76	1.3 (1.0, 1.7)	88	1.7 (1.3, 2.0)	0.076
Whiteley index of hypochondriasis	71	4.1 (3.4, 4.7)	81	3.1 (2.6, 3.6)	0.025
Affective state	75	4.3 (3.4, 5.2)	83	3.8 (3.1, 4.6)	0.766
Disease affirmation	75	6.5 (6.1, 7.0)	81	6.7 (6.3, 7.2)	0.556

Values are shown as mean (95% confidence interval). †n refers to the number of scores analyzed in each group. P-values were calculated using Mann-Whitney U-test.

fundoplication groups. The exposure of the distal esophagus to acid reflux (as assessed by 24-h pH measurement) in both groups was similar. The laparoscopic anterior partial fundoplication group were significantly older and had a significantly lower mean percentage of propagated primary esophageal peristaltic waves than the Nissen total fundoplication cases (Table 1).

With respect to the illness behavior questionnaire, all 62 of the questions were answered by 82% (63 from 77 cases) for the anterior partial group and 78% (70 from 90 cases) from the Nissen group. For patients with unfinished questionnaires, all of the illness behavior category scores that were complete were included in the analysis. Table 2 shows the number of illness behavior scores analyzed and mean score per illness behavior category from each group. We found a significantly higher general hypochondriasis ($P = 0.041$) and Whiteley index of hypochondriasis ($P = 0.025$) scores for the anterior partial fundoplication group compared with the Nissen group. There were no statistically significant differences between the groups with respect to all of the other illness behavior categories (Table 2).

Heartburn scores 12 months after operation reduced significantly for laparoscopic anterior partial fundoplication ($P < 0.001$) and Nissen total fundoplication ($P < 0.001$) compared with corresponding

Table 3 Comparison of preoperative score with postoperative outcome after 12 months for each fundoplication group

Score	Anterior partial (n = 77)	Nissen total (n = 90)
Pre-op heartburn	7.6 (6.7, 8.4)*	8.3 (7.7, 9.0)**
Post-op heartburn (after 12 months)	1.3 (0.8, 1.8)*	1.1 (0.4, 1.9)**
Pre-op dysphagia	3.2 (2.1, 4.2)	2.4 (1.5, 3.3)
Post-op dysphagia (after 12 months)	1.4 (0.7, 2.2)	1.9 (1.2, 2.6)
Satisfaction	8.2 (7.4, 9.1)	8.4 (7.6, 9.2)

Values shown are mean (95% confidence interval). * $P < 0.001$, ** $P < 0.001$ by Wilcoxon test. Comparisons between pre- and postoperative dysphagia scores were not statistically significant ($P \geq 0.05$).

preoperative values (Table 3). Dysphagia for solids scores after 12 months were reduced in both groups but the differences failed to reach statistical significance (Table 3). We examined the relationship between preoperative illness behavior score and outcome for each type of fundoplication using Spearman's coefficient and found no significant correlation with patient satisfaction or dysphagia score in either group (Table 4). There was a statistically significant negative correlation of -0.307 for affective inhibition with postoperative heartburn score at 12 months in the anterior partial fundoplication group ($P = 0.048$)

Table 4 Correlation of preoperative illness behavior with outcome from laparoscopic antireflux surgery

Illness behavior category	Anterior partial			Nissen total		
	Heartburn	Dysphagia	Satisfaction	Heartburn	Dysphagia	Satisfaction
General hypochondriasis	0.063	-0.003	-0.093	0.157	-0.032	0.045
Disease conviction	0.053	0.056	-0.125	-0.134	0.053	0.010
Psychological versus somatic perception	-0.204	-0.106	0.244	0.094	0.221	-0.052
Affective inhibition	-0.307*	0.013	0.008	0.176	-0.030	-0.112
Affective disturbance	0.033	-0.039	-0.123	0.108	0.128	0.016
Denial	0.054	-0.200	0.078	0.036	-0.239	-0.091
Irritability	0.024	0.040	-0.004	0.034	0.002	0.153
Whiteley index of hypochondriasis	-0.012	0.101	-0.186	0.071	0.032	-0.131
Affective state	0.125	0.054	-0.133	0.128	0.098	0.100
Disease affirmation	0.085	0.093	-0.161	-0.068	-0.042	-0.003

Values shown are Spearman correlation coefficients. Apart from * $P = 0.048$, none of the other correlations were statistically significant ($P \geq 0.05$).

but no such correlation was observed in the Nissen fundoplication group (Table 4).

DISCUSSION

In this study we examined the effect on outcome of allowing a partly subjective assessment of preoperative illness behavior to influence the type of wrap undertaken in laparoscopic fundoplication. We also objectively measured illness behavior in these patients using a questionnaire. The overall complete response rate was relatively high at 80%. Although 20% of questionnaires were incomplete (the patient was unable to commit to either a 'yes' or 'no' answer for one or more questions), analyzable data was obtained for between 90 and 100% of cases for each illness behavior category. The number of patients refusing or unable to complete the questionnaire was very low at 3%, indicating that the data analyzed was probably a representative sample from the desired population.

We identified statistically significant differences in age, primary esophageal peristalsis and two measurements of hypochondriasis between the groups of patients selected for laparoscopic anterior partial and total Nissen fundoplication, but no significant correlation between preoperative illness behavior score and satisfaction with the procedure. Although the decision on case selection was not based on the result of the illness behavior questionnaire, it appears that our preoperative clinical assessment had identified groups of patients undergoing laparoscopic antireflux surgery with measurable differences in their illness behavior. The differences in age and primary esophageal peristalsis may have been a coincidence, or could be related in some way to the presence of phobic behavior.

In these tailored groups, we were unable to confirm the negative correlation that was previously identified between preoperative illness behavior and satisfaction with laparoscopic Nissen fundoplication.⁷ We believe that this was due to our selection of patients into two groups: those most and those least likely to be troubled by postoperative sequelae.

We acknowledge that our criteria for selecting patients was scientifically 'soft' and that the threshold at which we offered a partial rather than a total fundoplication is a 'gray area'. Clinicians usually rely on their experience to make decisions within this uncertainty and our justification for writing this paper is that we appear to be getting it right in this situation. In our previous study, alternatives to a total fundoplication had not been established, and it may be that the outcome of some of those dissatisfied patients may have been improved if they had undergone an anterior partial fundoplication.

The laparoscopic partial fundoplication has emerged as a modification of the total Nissen fundoplication

in an attempt to reduce unwanted side-effects such as gas bloat, dysphagia, difficulty vomiting or belching.¹⁴ Both types of operation similarly increase lower esophageal resting pressure and abolish transient lower esophageal relaxations.¹⁵ However, laparoscopic Nissen fundoplication is associated with significantly higher postoperative intragastric pressures after gastric distension than laparoscopic anterior partial fundoplication.¹⁵ This may explain some of the differences in side-effects. It was previously considered that a partial fundoplication may be more appropriate for patients with impaired esophageal motility, but several studies have disputed this.^{16,17} We consider that it is not unreasonable practice to offer a partial fundoplication to patients who are very concerned about the side-effects of surgery as long as they are made aware of an increased risk of recurrent reflux.¹⁴ Based on the evidence from this work and the work that preceded it, we now use illness behavior questionnaire hypochondriasis scores as a further discriminating factor when planning laparoscopic antireflux surgery and should evaluate the use of this measurement in a further prospective evaluation.

We have also identified a statistically significant negative correlation between affective inhibition score and postoperative heartburn in the laparoscopic anterior partial fundoplication group. Although this could be a type I statistical error, this observation could mean that patients who have difficulty expressing personal feelings complain less of postoperative heartburn. This again provides some evidence that the outcome of surgery with respect to symptoms can be reflected in part by preoperative illness behavior.

Other researchers have demonstrated that psychosocial disorders affect outcome after laparoscopic antireflux surgery¹⁸ and have suggested that these factors should be considered when deciding upon which type of fundoplication wrap to recommend.¹⁹ Patients with depressive illness who underwent laparoscopic fundoplication developed more postoperative dysphagia and chest pain after a Nissen total fundoplication compared with a partial Toupet procedure.¹⁹ There is thus increasing evidence that preoperative psychological issues should influence the laparoscopic surgical decision-making process in order to optimize outcome. The current study shows that outcome is good to excellent after 12 months with a tailored approach to laparoscopic fundoplication, but further studies are required to confirm this.

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