# Quality of life for patients with gastroesophageal reflux disease 2 years after laparoscopic fundoplication

## Evaluation of the results obtained during the initial experience

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**Abstract**
*Background:* Health-related quality of life (HRQL) is significantly affected by gastroesophageal reflux disease (GERD), and its evaluation is emerging as a factor important to select treatment options for GERD. Antireflux laparoscopic surgery improves HRQL. The aim of this study was to compare the preoperative and medium-term postoperative HRQL in patients submitted to laparoscopic fundoplication during the initial experience to verify its possible influence on HRQL outcomes.
*Methods:* Clinical assessment, endoscopy, and a previously validated HRQL index were performed before and 2 years after surgery in 32 patients who underwent at the beginning of our experience.
*Results:* The esophageal mucosa returned to normal 2 years after laparoscopic fundoplication in 81% of the patients. Heartburn was absent or occasional in 93%, and 65% were free of antisecretory drugs. All postoperative HRQL items were significantly improved ($p < 0.0001$), with the postoperative curve of HRQL scores superposable to those of healthy Italian subjects (Italian normative sample).
*Conclusions:* The initial phase of learning does not affect the improvement of HRQL observed after laparoscopic antireflux surgery, which is consistent with durable relief of symptoms and endoscopic healing. Evaluation of HRQL should be added to, and probably could replace in most cases, the objective postoperative testing.

**Key words:** Gastroesophageal reflux disease — Laparoscopic fundoplication — Learning curve — Quality of life

During recent years, there has been a growing interest in measuring the quality of life and the patient's satisfaction as important factors in evaluating the success of either medical or surgical treatment [5, 8, 13, 15]. Measurement of health-related quality of life (HRQL) is therefore becoming an important endpoint for clinical trials.

Gastroesophageal reflux disease (GERD) significantly affects the HRQL of the patients [16], which has been reported to be improved by either medical [15] or surgical [6, 10, 13] treatment, both of which render burdening lifestyle modifications obsolete. Laparoscopic fundoplication seems to be highly effective in controlling symptoms of GERD [29], and can be considered an attractive alternative to medical therapy, especially in young fitted patients.

The traditional measures used to assess the outcome of a surgical treatment are mortality and morbidity rates, length of hospital stay, complications, and resolution of symptoms. From the aforementioned reports, the evaluation of HRQL after surgery is emerging as an additional factor important in determining the role of surgery in the treatment of GERD and in selecting a treatment option for these patients.

It is now well established that either medical or surgical therapy does improve the quality of HRQL in patients with GERD [6, 11]. After the advent of laparoscopy, it also was shown [24] that laparoscopic antireflux surgery produces amelioration in reflux symptoms equivalent to that of the open approach, with similar improvement in HRQL outcomes. In the aforementioned studies, different questionnaires (e.g., GERD-HRQL, gastrointestinal quality of life index [GIQLI], gastrointestinal symptoms rating scale [GSRS] and short form 36 [SF-36]) have been used, and all have given consistent results.

Although it is clear that in expert hands and in referral centers laparoscopic surgery is invariably followed

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by improvement of HRQL [6, 8, 10, 13], it still is unclear whether operations performed during the learning phase of the technique can achieve equally good results. We therefore evaluated this parameter in our first series of 50 patients submitted to laparoscopic fundoplication for GERD. The Short Form–36 (SF-36) general health survey questionnaire was adopted because it is regarded widely as one of the most useful tools for assessing patient HRQL. Previous reports [5] have found that it fulfills the criteria of validity, reliability, reproducibility, and sensitivity, all of which are needed for evaluation of the HRQL before and after treatment for upper gastrointestinal disorders. The postoperative HRQL assessment was performed after at least 2 years of postoperative follow-up evaluation. In addition, symptom scores and endoscopic findings were considered and compared with the HRQL outcomes.

## Materials and methods

During the past 6 years, 92 patients were consecutively submitted to laparoscopic surgery for GERD at our institution. The indications were early recurrence of severe symptoms or persistent complications of the disease in spite of long-term adequate medical therapy (i.e., high-dose proton pump inhibitors). Most of the patients were young subjects unwilling to accept lifelong medical treatment. Only three patients were truly nonresponders to medical therapy. Two patients had atypical symptoms (asthma and laryngitis, respectively). Upper gastrointestinal x-ray, upper gastrointestinal endoscopy, esophageal manometry, and 24-h pH recording were performed for all the patients before surgery. All the patients were asked to evaluate their quality of life at least 1 week before surgery by filling the SF-36 form. All of the first 50 cases submitted to surgery during the learning phase [30] (from 1994 to 1998) were recalled for a follow-up evaluation more than 2 years after the operation. Of these, seven subjects underwent conversion to open surgery, seven did not complete the questionnaire either before or after surgery, and four underwent re-operation for complications or failures of the procedure. Therefore, 32 patients were eligible for entry into the study. They were submitted to endoscopy as well as clinical and functional (where needed) evaluation by an interview, and were required to complete the SF-36 questionnaire.

### Upper digestive endoscopy

Upper digestive endoscopy (Olympus Gif-Q 140, Olympus Optical, Hamburg, Germany) was performed on an outpatient basis. Esophagitis grading (I, II, III, IV) was determined according to the Savary-Miller endoscopic grading system [19].

### Esophageal manometry and 24-h pH recording

In all patients, before pH-metry, the lower esophageal sphincter was located by esophageal manometry, using a medical measurement system (MMS) (Medical Measurement System, Enschede, The Netherlands), as previously described [4].

We performed 24-h esophageal and gastric pH recording using dual-channel antimony catheters (Zynetics) and a digital data logger (Digitrapper MKII; Synectics, Stockholm, Sweden). A reflux time (i.e., total percentage of time that pH was less than 4) of 5% or more was considered abnormal.

### Surgical technique

All the surgical procedures were performed by the same surgeon (S.C.), and the team did not change for the first 40 patients. A Rossetti fundoplication was performed in 25 patients with normal esophageal motility. Seven patients with poor esophageal motility, according to criteria pre-

viously specified, underwent a Toupet fundoplication with an approach tailored to antireflux surgery to avert potential postoperative dysphagia.

All the fundoplications were performed through a wide posterior window. Hepatogastric and phrenoesophageal ligaments were cut by coagulating endoscissors. Incision of the hepatogastric ligament was performed above and below the hepatic branch of the anterior vagal nerve, which we tried routinely to spare. The esophagus was extensively isolated, and the esophageal hiatus was closed with one or two sutures. An esophageal bougie was placed into the esophagus of the first 25 patients, but was considered unnecessary in the other patients of the current study, thanks to increasing experience, because it was possible to obtain a loose wrap regardless whether a bougie, was used.

In the Rossetti procedure, the wrap was made loose and short using two stitches placed 2 cm apart, without taking the esophageal wall within the sutures. Vagal trunks were separated from the esophagus and not comprised in the wrap. In the Toupet procedure, the right wrap of the 260° fundoplication was anchored to the right crus of the diaphragm with two stitches. Both arms of the wrap were fixed to the esophageal wall with two stitches on each side. All the sutures were performed with 2-0 Ethibond.

A nasogastric tube was kept for the first 24 h after surgery. A meglumine diatrizoate–Gastrografin® (Schering AG, Berlin, Germany) videoesophagogram was performed on postoperative day 1 before drinking or eating, and the patient was discharged on postoperative day 2.

### Postoperative outcome

Operative times, rates of conversion, length of hospitalization, morbidity, and mortality at 30 days were recorded for each patient. The clinical outcome at 2 years was evaluated according to the following factors.

### Reflux symptoms

During an interview, all the patients were asked about the frequency and severity of their symptoms. Heartburn and regurgitation were graded according to a previously described scale [13]: 0 (symptom not present), 1 (symptom present occasionally, not interfering with daily activities), 2 (symptom present frequently, interfering with daily activities), 3 (symptom present constantly, severely interfering with daily activities).

### Use of antisecretory drugs

The need for antisecretory drugs to control reflux-related symptoms was assessed, and the patients were divided into three groups according to the following criteria: (a) no need of taking drugs, (b) occasional (on demand) use of drugs, (c) regular use of drugs.

### Surgery-related untoward effects

Patients were questioned for the presence of the following side effects: dysphagia, abdominal fullness, altered bowel habit, inability to belch, and vomiting. Dysphagia was scored as follows [7]: Grade I (ability to eat a solid food), Grade II (ability to eat a semisolid food), Grade III (ability to swallow liquid only), Grade IV (complete obstruction, with Grade III considered as severe dysphagia).

### Postoperative upper gastrointestinal endoscopy

This procedure was performed in all the cases considered in this study after the clinical evaluation. Postoperative 24-h pH esophageal recording and esophageal manometry were not performed routinely in the postoperative workup, but reserved only for patients with relapsing symptoms not totally justified by endoscopic findings.

### Quality of life

A self-administered questionnaire was chosen to minimize the physician's influence during its completion. Quality of life was measured using the Medical Outcome Study Short-Form–36 Health Survey (SF-

36) (Italian version), a generic health status measure used widely in medical and health service research. The SF-36 has eight scales measuring physical function, bodily pain, role limitations–physical, vitality, general health perceptions, social function, role limitations–emotional, and mental health, respectively. Scores range from 0 to 100, with higher scores indicating better functioning and well-being. The reliability of the SF-36 subscales (Italian version) ranges from 0.77 to 0.93, and considerable evidence has accumulated showing the scale's construct validity [2].

The same questionnaire was administered to the patients 1 week before surgery and after at least 2 years of follow-up evaluation. Surgical and clinical explanations about GERD and its methods of treatment were offered to the patients well before surgery to obtain an informed and "motivated" consent. Written information about postoperative eating behavior and the possibility of early dysphagia was given to all the patients before surgery. The preoperative results for each item of the SF-36 were compared with those of the published data for the Italian normative sample [2]. Pre- and postoperative results for each item also were compared.

## Statistical evaluation of data

The questionnaires were analyzed and scored according to Apolone et al. [3]. Values are presented as a mean ± standard error of mean. The results of preoperative and postoperative questionnaires from the same patient were compared using a signed-rank (Wilcoxon) test. Indeed, although the eight health concepts generated from the SF-36 forms are reported on scales from 0 to 100, they may not follow a normal distribution [31]. The postoperative results also were compared with established scores of general health from a representative sample of healthy persons in Italy [2]. This comparison was performed according to Motulsky [14] by calculating the deviations of the recorded values from the normative value (calculated for gender and age), then summing the ranks of the positive deviations and comparing them with the sum of the ranks of the negative deviations. A p value less than 0.05 was considered significant. All the calculations were performed using the Instat program (GraphPad Software, San Diego, California, USA) on a MacIntosh computer.

## Results

### Demographics and characteristics of the patients

Of the first 50 patients, 18 did not meet the inclusion criteria. Seven patients (7/50; 14%) underwent conversion to open surgery because of difficulty with the procedure. One patient had an early repair of a gastric fundus perforation, unrecognized at surgery, whereas three patients underwent reoperation, respectively, for disabling dysphagia, a slipped wrap, and disruption of the wrap. Seven patients did not complete the questionnaire either before or after surgery. Therefore, only 32 patients were eligible for the study. The preoperative clinical data of the 32 patients are shown in Table 1. The mean follow-up period was 35.7 months (range, 24–67 months).

### Surgical outcome

A pneumomediastinum occurred in three patients without consequences, and the mortality rate was 0%. The mean operating time was 105 min (range, 85–240 min). A slipped wrap was observed at 2 months, with mild relapsing symptoms, and two patients had a partial disruption of the wrap with relapsed symptoms after a Toupet procedure.

**Table 1.** Patient demographics and clinical characteristics

|  | n (%) |
| --- | --- |
| Gender (M/F) | 18/14 |
| Age, median (range) | 43 (23–68) |
| Sliding hiatal hernia, n (%) | 30 (93) |
| Normal mucosa | 0 (0) |
| 1° Esofagitis, n (%) | 16 (50) |
| 2° Esophagitis, n (%) | 11 (34) |
| 3° Esophagitis, n (%) | 2 (6) |
| Intestinal metaplasia, n (%) | 3 (9) |
| Mean preoperative DeMeester score, n (range) | 119 (27–225) |
| Impaired esophageal motility at manometry, n (%) | 8 (25) |
| Hypotensive LES, n (%) | 32 (100) |

### Postoperative endoscopy (after more than 2 years)

A normal esophageal mucosa was observed in 26 patients (81%), whereas grades 1 and 2 esophagitis were found, respectively, in one (3%) and two patients (6%). Intestinal metaplasia, involving three patients, was unchanged.

### Reflux symptoms

All the patients complained of heartburn preoperatively, but after surgery more than one-half of the patients (18–56%) were symptom free, whereas 12 (37%) and 2 (6%) patients, respectively, experienced grades 1 and 2 heartburn. Regurgitation of some degree before surgery was reported by 24 patients (75%). Only six patients (19%) experienced this symptom during more than 2 years of follow-up evaluation.

### Need for antisecretory drug

Among 65% of the patients (21/32), no antisecretory or antacid drug were used 2 years after surgery. At this writing, three patients (9%) still are taking drugs regularly, and eight (25%) use drugs occasionally, according to symptoms.

### Surgery-related side effects

Early dysphagia was observed in 15 patients (47%). Two of these patients were dilated endoscopically 4 months after surgery. At 2 years, five patients (16%) had occasional dysphagia with thick food. Abdominal fullness was reported by 12 patients (37%), and 4 patients experienced (12%) inability to belch. Three patients (9.3%) reported constipation, and four had transient diarrhea.

### Quality-of-life index

The mean preoperative SF-36 scale scores of our patients were lower than those of healthy individuals for every SF-36 item. Conversely, 2 years after surgery, the different HRQL scores were comparable to those of

**Table 2.** Mean scores of the different SF-36 scales in patients with gastroesophageal reflux disease before and 2 years after surgery

| Scale | Italian normative sample[a] (M ± SD) | Preoperative (M ± SD) | Postoperative[b] (M ± SD) | p (before vs after) |
|---|---|---|---|---|
| Physical functioning (PF) | 84.46 ± 23.18 | 73.97 ± 20.46 | 89.217 ± 15.37 | < 0.0001 |
| Role physical (RP) | 78.21 ± 35.93 | 30.17 ± 32.31 | 75.00 ± 34.11 | < 0.0001 |
| Bodily pain (BP) | 73.67 ± 27.65 | 30.34 ± 21.89 | 71.94 ± 25.54 | < 0.0001 |
| General health (GH) | 65.22 ± 22.18 | 36.34 ± 16.73 | 62.16 ± 22.32 | < 0.0001 |
| Vitality (VT) | 61.89 ± 20.69 | 43.23 ± 16.81 | 62.42 ± 17.12 | < 0.0001 |
| Social functioning (SF) | 77.43 ± 23.34 | 42.19 ± 25.88 | 74.50 ± 22.05 | < 0.0001 |
| Role emotional (RE) | 76.16 ± 37.25 | 37.65 ± 34.24 | 80.97 ± 34.08 | < 0.0001 |
| Mental health (MH) | 66.59 ± 20.89 | 49.06 ± 18.89 | 71.87 ± 19.28 | < 0.0001 |

[a] Scores derived from a sample of 2,031 healthy subjects [3]
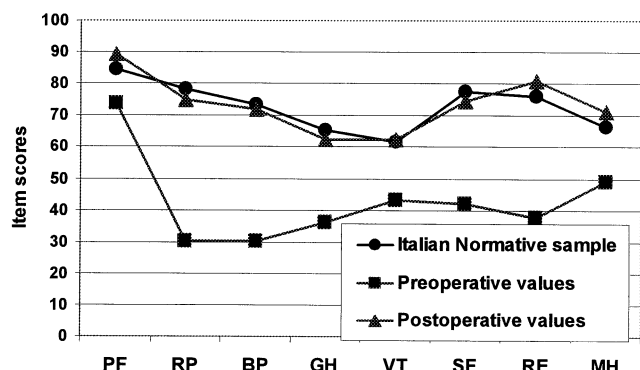[b] Scores not significantly different from those of the Italian normative sample



**Fig. 1.** Quality-of-life pattern in patients with gastroesophageal reflux disease before and 2 years after antireflux surgery. Note that postoperative health-related quality-of-life scores are comparable with those of the healthy Italian population (Italian normative sample).

healthy Italian subjects (Fig. 1). The mean scores for each scale pre- and postoperatively are presented in Table 2. A significant improvement after surgery was observed in all the scores.

## Discussion

It is well known that the quality of life is significantly reduced for GERD patients [17, 26]. These patients are troubled not only by symptoms, but also by the medical treatment and the need for lifestyle modifications. They are frustrated or anxious about their illness and the potential side effects of lifelong medical therapy. Psychiatric disorders are not rare in these patients, and concomitant psychosocial factors have been observed to affect the clinical outcome after treatment [27]. Therefore, it is not surprising that in the recent years several observations concerning the influence of medical and surgical treatment on the HRQL of patients with GERD have been reported [6, 15, 18, 20]. The evaluation of treatment efficacy is improved by taking the psychometric parameters into consideration. Consequently, assessment of surgical treatment outcome not only by objective testing, but also by subjective judgment of the patients and by an evaluation of their quality of life is diffusely improving.

Laparoscopic fundoplication has been shown to improve HRQL significantly [10, 13] for patients with

GERD, giving better quality-of-life outcomes than open surgery [25]. However, the level of HRQL in a healthy control population may not always be reached after surgical treatment [8]. Preoperative functional dyspepsia, which is not affected by fundoplication [20], or a poor selection of patients, whose symptoms actually may be unmasked by surgery, may play a role in producing suboptimal results. The laparoscopic approach also might be affected by the initial phase of learning, which is technically demanding, especially in relation to the resolution of symptoms and the presence of side effects, which strongly influences the HRQL. Accordingly, this study was undertaken to assess whether HRQL improvement after laparoscopic fundoplication performed during the learning phase overlaps that reported in the literature.

The results of the current study are consistent with the previously published results for antireflux surgery [9]. At 2 years, 56% of the patients were without symptoms, and 37% had only occasional heartburn. Thus, 93% had good results. In this study, 65% of the patients needed no therapy, in contrast with the data of a recently published trial [21] with a follow-up period longer than 10 years, in which 62% of the patients yet used antisecretory drugs regularly after surgery. The longer follow-up period and the larger number of patients of this latter study might be a likely explanation for the difference.

Objective endoscopic control confirms the healing of esophagitis in most patients (81%). Intestinal metaplasia did not disappear, but findings show that antireflux surgery does not have predictable effects on the extension of Barrett's esophagus [9]. Although symptoms and esophageal lesions do not always correlate in GERD patients [12], healing of esophagitis together with symptom relief undoubtedly contributes to the overall improvement in quality of life after antireflux surgery [22, 28].

In addition to providing an objective control of reflux with repair to a normal mucosa, laparoscopic fundoplication allows the compromised quality of life to resume normal values. The HRQL before surgery was significantly impaired in our patients, as compared with that of healthy subjects, although all of them were on long-lasting medical therapy proton pump inhibitor at full dose. However, the score distribution 2 years after surgery showed a significant improvement in the pa-

tients state of health, which can be superimposed on that of the Italian normative sample derived from 2,031 healthy subjects [2].

All the SF-36 items improved significantly. Short-term HRQL was purportedly not assessed since Glise et al. [6] reported initial "supernormal" values that could be interpreted as euphoria resulting from the combination of symptom relief and the fact that the surgical procedure was successful. Nevertheless, the stability of the results at 2 years highlights the benefit perceived by the patient with the surgical treatment. The satisfaction of the patients is rewarding despite the fact that five of them reported occasional dysphagia at 2 years. This well-known side effect after antireflux surgery is in significant relation to the patient's ability to adapt his or her postoperative eating behavior. A reassuring psychological intervention before and after surgery might be effective in reducing these problems.

The patients studied represented only 64% (i.e., 32 of 50) of those who underwent surgery at the beginning of the experience, and this could represent a selection bias. A tribute to the initial phase of learning the technique is reflected in the high percentage of conversions (not resulting from complication) and the early complications or failures, with four consequent reoperations. Nevertheless, taking into account the obvious worse early results in a particularly complex technique such as laparoscopic fundoplication, the outcome for this group shows that the clinical and endoscopic findings as well as the HRQL scores may remain satisfactory over the long term in the patients who get through the first months after surgery.

Comparison of generic (SF-36) versus disease-specific (e.g., GERD–HRQL) quality-of-life scales for GERD [23] suggests that generic instruments are less sensitive in measuring the effects of treatment of GERD. However, the reproducibility and validity of the SF-36 for evaluating the HRQL of patients after Nissen fundoplication has been confirmed and well correlated recently with a disease-specific symptom questionnaire [1]. The choice of instruments is entirely dependent on the investigator's reason for measuring HRQL, but the SF-36 appears to be responsive enough to detect HRQL differences in clinical trials of alternative therapeutic strategies for moderate to severe GERD.

In conclusion, effective treatment of GERD likely will result in an improvement detectable by generic measures of health status, as confirmed by this study. Moreover, a long-term significant improvement in HRQL is obtained even during the initial learning phase, when worse results may well be expected. Evaluation of patient quality of life should be added to, and in most cases probably could replace, the objective tests as a useful tool for verifying the efficacy and long-term outcome of any method used for in GERD therapy (medical, surgical, or endoscopic).

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