



Quality of Life Associated with Surgery for Esophageal Cancer: Differences between Collar and Intrathoracic Anastomoses

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Abstract. Postoperative survival and complication rates have traditionally been the standard parameters of outcome after oncologic surgery. In tumors with poor patient survival, such as esophageal cancer, studies about quality of life are rare. The objectives of this study were to assess outcomes in terms of quality of life in patients with esophageal cancer when investigating differences between two surgical reconstructive procedures: intrathoracic anastomosis and collar anastomosis. A total of 108 patients with esophageal cancer had undergone surgery for esophageal cancer in our department from 1992 to 2000. Median survival was 36 months with no significant differences between patients undergoing collar or intrathoracic anastomosis. After determining the survival status, questionnaires on quality of life were sent to all patients 1 to 2 years after surgery. We received data from 46 patients. The responders were divided into groups of intrathoracic anastomosis ($n = 24$) and collar anastomosis ($n = 22$). Patients with the collar anastomosis showed significantly better physical and social functioning and global health status. From the viewpoint of postoperative quality of life, reflux-related symptoms were the major problem for patients with an intrathoracic anastomosis. These symptoms cause significant insomnia and impair social and physical function. The study showed that assessing quality of life with specific and general instruments is helpful for determining the differences between surgical procedures where standard parameters such as survival have their limitations.

Carcinoma of the esophagus is a rare tumor with a poor prognosis if not treated with radical surgery [1]. The preoperative diagnostic course is complex, and radical surgery is often combined with an adjuvant therapy to improve survival [2, 3]. Even with this comprehensive treatment, fewer than 20% of patients can realistically expect to survive more than 5 years [4, 5]. The socioeconomic background of these patients is often characterized by unemployment, a low standard of education, and abuse of alcohol or tobacco (or both), factors that often contribute to the poor survival and perioperative complications [6]. In most of these patients, one of the main objectives of surgery and adjuvant treatment is maintenance of sufficient quality of life (QoL) during the limited survival time. Unfortunately, little is known about QoL following surgery for

esophageal cancer, particularly with regard to physical, emotional, cognitive, social, and economic dimensions [7].

Operative therapy consists of resecting the esophagus via thoracotomy, radical intrathoracic and upper intraabdominal lymphadenectomy, and net resection. The standard technique, if possible, for reconstructing the food passage is a gastric tube with a collar anastomosis. If stomach is not suitable because of previous surgery, a colonic segment is used as an esophageal substitute. In 30% of cases an intrathoracic anastomosis is an alternative to the collar anastomosis [5, 8]. In a few studies collar anastomosis was associated with a high rate of impaired postoperative swallowing and therefore was less preferred by these authors [9]. During follow-up we often experienced nonspecific differences between patients with collar and intrathoracic anastomoses.

In this study, QoL after resecting the esophagus was assessed using a validated multidimensional instrument for general QoL in those with cancer and a tumor-specific module. The aim was to investigate differences between surgical procedures in terms of their impact on QoL. We hypothesized that differences between the anastomosis are detectable by evaluating the outcome in terms of the QoL.

Patients and Methods

In this retrospective study 108 patients with thoracic esophageal cancer who had undergone resection and reconstruction at least 1 year previously in our department from January 1992 to December 2000 were included. Patients with proximal gastric tumors, those with benign lesions, those over 85 years of age, and patients with psychiatric disorders were excluded. Informed consent to use patient data is routinely obtained from records of the patient's prior surgery in our department.

The patients' physicians were contacted prior to mailing the questionnaires to determine survival status and, when applicable, cause of death. All patients who were alive 1 to 2 years after surgery received a questionnaire asking for information about sociodemographics and the impact of cancer on their QoL. Details of their

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medical and drug history, histology, stage of disease, and therapy were collected from the patient's chart. The general cancer-related QoL was measured with the European Organization for Research and Treatment of Cancer (EORTC) QLQ-C-30 [10]. In this questionnaire QoL is assessed on seven dimensions: functional status, role function, general symptoms, cognitive, emotional, and social functioning, and financial strain. In addition to the general questionnaire we used a tumor-specific module that was developed according to the guidelines of the EORTC [11]. This additional instrument focuses on food passage, dumping syndrome, postoperative hoarseness, heartburn, weight loss, sexuality, and reflux-related symptoms. Both questionnaires contain questions related to the previous week. Four response categories, from 1 (not at all) to 4 (very much), are possible. The scoring systems are organized such that a high score indicates better function and more symptoms (more distress). Thus a high score for a functional scale or global health status/QoL represents a high level of functioning (high QoL), but a high score for a symptom scale/item, as in the specific module, represents a high level of symptomatology/problems. The principle for the scoring is to estimate the average of the items that contribute to the scale; this is the raw score. A linear transformation is used to standardize the raw score, so scores range from 0 to 100 [12].

Of the 108 patients potentially available, 56 patients had died from their disease. The questionnaires were mailed to the other 52 patients. Three addresses were unknown, and three questionnaires are still missing. The 46 patients who responded were divided into groups of intrathoracic anastomosis and collar anastomosis, consisting of 24 and 22 patients, respectively.

Statistical Analysis

Results are presented as total numbers or means \pm SD. All distributions and frequencies were compared by the χ^2 test. Age and data on length of hospital stay were compared by the unpaired *t*-test. Because QoL data were not normally distributed, nonparametric methods were used for the statistical analysis. The patient groups were compared by the Mann-Whitney U-test, Kaplan-Meier survival analysis, log-rank test, Fisher's exact test, and Cox regression. A value of $p < 0.05$ was considered significant. The scoring was performed according to the EORTC QLQ-C30 scoring manual [12]. Scales were calculated when at least half of the items were completed by the patients.

Results

Of the 108 patients potentially eligible for that study, 20 were women, and 88 were men. The patients ranged from 28 to 73 years (average 57.4 years). Median survival was 36 months. There were no significant differences in survival between patients with the collar and intrathoracic anastomoses (log-rank 0.61) as shown in Figure 1. Sixty-two patients (57.4%) had a collar anastomosis and 46 patients (43.6%) an intrathoracic anastomosis. The overall time to perform the operation, including anesthesia, was not significantly different for the two procedures (9.20 vs. 9.15 hours). R0 resection (i.e., resection margins microscopically free of tumor) was performed in 95 cases (87.9%); 9 patients (8.3%) underwent R1 resection (i.e., resection margins microscopically infiltrated by the tumor), and 2 patients (1.8%) had an R2 resection (i.e., resection margins macroscopically infiltrated by the tumor). The postopera-

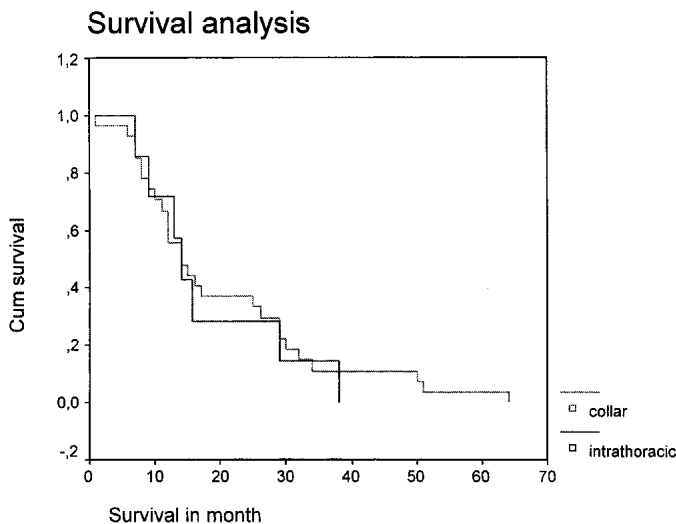


Fig. 1. Kaplan-Meier survival analysis of patients undergoing collar or intrathoracic anastomosis for esophageal carcinoma. Log-rank test showed no significant differences (0.61).

tive complication rate was higher in patients with a collar anastomosis (14 cases, 12.9%) than in those with an intrathoracic anastomosis (8 cases, 7.4%). Insufficiencies occurred in five patients with a collar anastomosis; none was lethal. Among the patients with an intrathoracic anastomosis three insufficiencies were observed, of which two were lethal owing to pneumonia and sepsis. Temporary paralysis of the recurrent nerve was seen in four patients with a collar anastomosis, and aspiration occurred in two. All other complications consisted of small wound abscesses and urinary tract infections. Histologic findings revealed adenocarcinoma in 33 patients (30.5%) and squamous cell carcinoma in 69 (63.8%); one patient (0.9%) had carcinosarcoma, and another (0.9%) had a stromal cell tumor. Sociodemographic backgrounds and patterns of consumption of recreational drugs were similar for the two groups. The patients' characteristics are summarized in Table 1. Significant differences were seen in the EORTC function and symptom scales. Physical and social functioning were significantly better for patients with a collar anastomosis, as presented in Figure 2. Patients with intrathoracic anastomoses scored 72 (scale range 0–100) for physical functioning, and patients with a collar anastomosis scored 79 (ex. sign. two-tailed, $p < 0.049$). Social functioning was rated 75 for the collar anastomosis patients and 55 for those with an intrathoracic anastomosis (ex. sign. two-tailed, $p < 0.04$). The global health rating was 58 for intrathoracic patients and 69 for those with collar anastomoses (ex. sign. two-tailed, $p < 0.05$). Complaints about insomnia were significantly higher among patients with an intrathoracic anastomosis (Score = 42) than in those with a collar anastomosis (Score = 21); (ex. sign. two-tailed, $p < 0.047$), as shown in Figure 3.

Similarly, the tumor-specific module questions about reflux problems showed significant differences between patients with different anastomosis sites. Both groups rated the postoperative changes of alimentary habits high (95, maximum 100). Reflux of gall or acid into the mouth was rated with a score of 17 for patients with a collar anastomosis, whereas patients with an intrathoracic anastomosis rated it 48 (ex. sign. two-tailed, $p < 0.033$). As a consequence, 68% of the intrathoracic anastomosis patients had to sleep in an upright position because of reflux problems (ex. sign.

Table 1. Characteristics of 108 patients with esophageal carcinoma: intrathoracic versus collar anastomosis.

Characteristic	Collar anastomosis	Intrathoracic anastomosis
No. of patients	62	46
Survival	36.1 months	35.8 months
Complication rate	12.6%	7.4%
Duration of surgery	9.20 hr	9.15 hr
Gender (Male/female)	50/12	37/9
Age (years), average	58	56
Smoking ^a	53	38
History of substance abuse		
Alcohol	44	12
Alcohol and tobacco	38	29
Marital status		
Divorced	26	20
Married	12	10
Not married	11	10
Widowed	7	5
Living with partner	28	20
Employment status		
Unemployed	35	25
Employed	16	12
Pension	12	9
Education		
School diploma	13	9
Maximum of 8 years of formal school education	36	23
Type of cancer		
Squamous cell carcinoma	40	31
Adenoma	21	14
Carcinosarcoma	1	0
Stromal cell carcinoma	0	11
TNM status		
T0	2	1
T1, 2	31	24
T3	28	20
T4	2	1
N0	25	19
N1	37	27
M0	55	41
M1	7	5
Resection		
R0	55	41
R1	5	4
R2	1	1

No significant differences were found between the two groups.
^aNumber of patients smoking ≥ 10 cigarettes per day.

two-tailed, $p < 0.02$) (Fig. 4). Vomiting was significantly higher ($p < 0.015$) in patients with the intrathoracic anastomosis (Score = 43) than in patients with a collar anastomosis (Score = 31). Finally, patients with an intrathoracic anastomosis rated the extent of strain caused by the medical treatment higher than did patients with a collar anastomosis ($p < 0.023$).

Discussion

Since the World Health Organization defined health as “not only the absence of infirmity and disease but also a state of physical, mental, and social well-being” [13], it has not been sufficient to define outcomes of therapy only in terms of survival and complication rates. This definition is relevant to the treatment of cancer, particularly esophageal cancer, which is often advanced by the time of presentation and progresses rapidly in many patients. In such patients QoL should be given prime consideration [8].

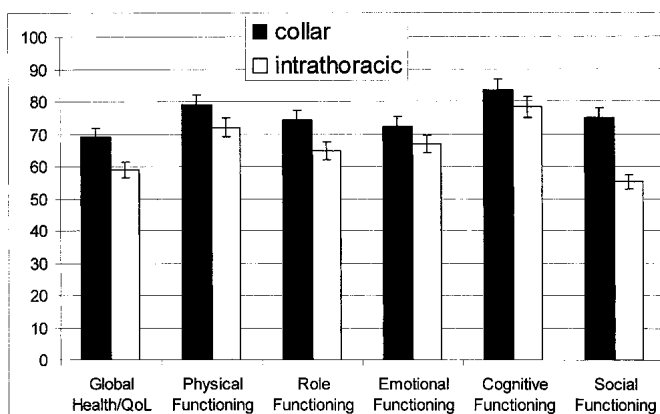


Fig. 2. European Organization for Research and Treatment of Cancer (EORTC) function scales for patients with esophageal cancer who underwent collar or intrathoracic anastomosis. Significant differences were seen in social and physical functioning and global health.

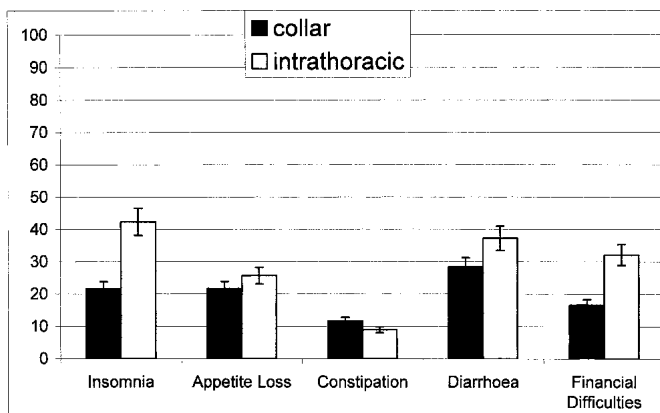


Fig. 3. EORTC symptom scales for patients with esophageal cancer who underwent collar or intrathoracic anastomosis. Significantly more complaints were seen in the scales for insomnia and financial difficulties.

In the present study we investigated QoL after surgery for esophageal cancer as an additional outcome. The main focus was on differences in outcome between two surgical procedures. The patients did not differ significantly in terms of survival. Therefore the survival time was not a sufficient parameter to assess outcome.

To measure general cancer-related QoL we used the EORTC QLQ-C-30, which is a valid, reliable instrument to assess QoL in cancer clinical trials [10, 14–19]. Although an official tumor-specific module for patients with esophageal cancer was developed by the EORTC 10 years ago [20], we thought that the latest therapeutic changes, such as adjuvant radiochemotherapy and surgical techniques, were not sufficiently included. In 10 prospective interviews, patients rated the instrument to be too difficult and too long. Because of these results we decided to modify the official EORTC instrument according to the guidelines of the EORTC for module development [11]. In the present study we used the official EORTC module for patients with esophageal cancer as a basis, adding questions about feeding tubes and placing more emphasis on postoperative reflux-related symptoms, which are of central importance for the patients [21–24]. Finally, with regard to modern therapeutic regimens, questions about the impact of the long preoperative diagnostic course and neoadjuvant radio/chemotherapy were added.

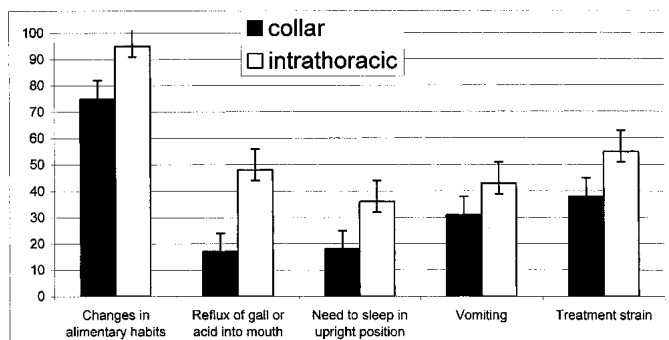


Fig. 4. Tumor-specific module for patients with esophageal cancer who underwent collar or intrathoracic anastomosis. Significant differences were seen in the scales for changes in alimentary habits, reflux-related symptoms, need to sleep in an upright position, vomiting, and extent of treatment strain caused by the disease.

The revised module for patients with esophageal cancer consists of 24 items, as shown in Figure 5. This modified module showed sufficient reliability in prospective studies, as determined by a Cronbachs α of 0.72. The above-mentioned interviews indicated a strong face validity [25].

The EORTC core questionnaire showed significant differences between the two surgical procedures in terms of physical and social functioning as well as general health status and financial areas. Global, emotional, cognitive, and role functioning were not significantly different between the two approaches. These findings are comparable to those derived by other studies [26–29]. In most of the studies in the literature, QoL was affected in terms of decreased social, emotional, and physical functioning [26]. However, no other study has so far compared the effects of different sites of anastomosis on cancer-specific QoL.

Zieren and coworkers [1] looked more generally at the overall impact of resection of the esophagus on quality of life. After 1 year of follow-up, physical and role functions were affected most frequently, and somatic limitations and dysfunction in emotional, social, and financial areas were significantly less common and rated less severe by the patients in their study.

According to our results, measuring general cancer-related QoL seems not to be sensitive enough to determine differences in outcomes after surgery for esophageal carcinoma. The different effects found in their study may be due to different selection criteria, operative regimens, the design of the study, and the expertise of the surgeons. The methods of assessing QoL in studies with patients after esophageal resection for cancer differ in terms of study design, instruments, and frequency of application. In the study by Zieren and co-workers [1] QoL was assessed by both patients and a psychologist using the EORTC QLQ-C-30 and the Spitzer Index [30]. In addition, a tumor-specific module has rarely been used [26]. Therefore there might be a lack of specific information to interpret these results.

By using a modified EORTC module for esophageal cancer we found significant differences regarding the site of anastomosis. Changing their eating habits was a major problem for patients with an intrathoracic anastomosis. Reflux-related problems, such as the need to sleep in an upright position due to reflux of gall or acid into the mouth, were found to be extremely important to patients with intrathoracic anastomoses, with an impact on their QoL. Patients with the collar anastomosis were significantly less affected or not

Patients sometimes report having the following symptoms. Please indicate to which extent you have experienced these symptoms during the past week.

	Not at all	a little	quite a bit	very much			
31. Have you been less efficient than usual?	1	2	3	4			
32. Did you have to change your eating habits?	1	2	3	4			
33. Have you lost weight?	1	2	3	4			
34. Have you had trouble to swallow solid food?	1	2	3	4			
35. Have you had trouble to swallow soft food?	1	2	3	4			
36. Have you had trouble to swallow liquid food?	1	2	3	4			
37. Have you had trouble to swallow your own saliva?	1	2	3	4			
38. Have you had to belch?	1	2	3	4			
39. Have you vomited?	1	2	3	4			
40. Have you had reflux of gall or acid into your mouth?	1	2	3	4			
41. Did you have to sleep in upright position?	1	2	3	4			
42. Did you have to cough more than usual?	1	2	3	4			
43. Did you have speech problems?	1	2	3	4			
44. Have you had pain?							
a) During or after your meal?	1	2	3	4			
b) In your belly?	1	2	3	4			
c) In your thorax (chest)?	1	2	3	4			
d) Somewhere else?	1	2	3	4			
If so, where?.....							
45a) Have you taken any medicine for pain?	1	2	3	4			
45b) If so , how much did it help?	1	2	3	4			
46. Did you have to use a feeding tube?	Yes		No				
			Yes	No			
47. Did your surgeon insert a small permanent tube in your esophagus to help you swallowing?			1	2			
48. Have you received any radio- or chemotherapy?			1	2			
49. To what extent did the medical treatment put you under strain?	1	2	3	4	5	6	7
	Not at all						very much
50. In which way did the medical treatment put you under strain?							
.....							
51. What has been most helpful for you besides the medical treatment?							
.....							
52. How much improvement of your health do you expect in the near future?	1	2	3	4	5	6	7
	none						very much
53. Are there any other things regarding your disease or treatment that are important for you and have not been mentioned so far?							
.....							
.....							
.....							
54. One final question: Have you received any other treatment since your surgery? If so , what type of treatment have you received?							
.....							
.....							
.....							

Thank you very much for your help

Fig. 5. Revised module for patients with esophageal cancer.

affected at all by these problems. Various studies have found significant differences due to the site of anastomosis. Collar anastomosis causes less gastroesophageal reflux than intrathoracic anastomosis, for example [27, 28, 31, 32]. Postoperative hoarseness, daily quantity of food intake, reflux, and heartburn seem to be the most important factors for patients after esophageal resection [29]. According to a 1997 study by Baba et al. [32], these factors may also be relevant in terms of long-term survival because reflux of gall or acid may eventually cause death due to a nonmalignant cause 10 years after esophageal resection for carcinoma. However, from the viewpoint of postoperative QoL, reflux of acid or gall remains the major problem for patients with an intrathoracic anastomosis. The expected effects of collar anastomosis on swallowing were not seen in this study [9]. We have concluded that specific modules for assessing outcomes after esophageal surgery are necessary.

Conclusions

We investigated the overall QoL of patients after resection of the esophagus and differences in quality of life in patients who had undergone one of the two surgical procedures. Although traditional parameters such as survival and the complication rate failed to differentiate between the two surgical approaches, the combination of a general cancer-related QoL questionnaire and a tumor-specific module did allow discrimination between collar and intrathoracic anastomoses [33–38]. Patients with a collar anastomosis had better physical and social functioning and were less affected by the treatment in terms of reflux-related symptoms than were those who had an intrathoracic anastomosis. From the viewpoint of postoperative QoL, reflux of acid or gall remains the major problem for patients with an intrathoracic anastomosis. This supports the clinical application of the QoL questionnaires in patients with esophageal cancer in the daily clinical routine [39].

To detect short- and long-term effects of treatment accurately, the time points of measuring QoL should be preoperatively, postoperatively, and at follow-up [40, 41]. Therefore the present study is limited in showing these effects because data on QoL were not routinely collected. The study therefore needs to be repeated using prospective QoL data before and after surgery and on follow-up. Currently this process of data collection is being implemented in the surgical program at the university hospital in Kiel.

Résumé. La survie postopératoire et les taux de complications sont les paramètres standard traditionnels pour évaluer les résultats de la chirurgie oncologique. En cas de tumeur associée à une survie réduite, tel que le cancer de l'oesophage, les études sur la qualité de vie sont rares. L'objectif de cette étude a été d'évaluer l'évolution en termes de qualité de vie chez les patients atteints de cancer de l'oesophage, en comparant deux procédés chirurgicaux, l'anastomose intrathoracique et l'anastomose au cou, pour la reconstruction. Cent huit patients porteurs de cancer de l'oesophage ont été opérés dans notre département entre 1992 et 2000. La médiane de survie a été de 36 mois sans aucune différence significative entre les patients ayant eu une anastomose intrathoracique ou cervicale. Après avoir déterminé la survie, des questionnaires sur la qualité de vie ont été envoyés à tous les patients survivants 1-2 ans après leur opération. Nous avons reçu des réponses provenant de 46 patients, divisés en deux groupes selon qu'ils ont eu une anastomose intrathoracique ($n = 24$) ou cervicale ($n = 22$). Les patients ayant eu une anastomose cervicale ont répondu qu'ils avaient une meilleure fonction physique et sociale ainsi qu'un meilleur état global de santé. D'un point de vue de qualité de vie postopératoire, le problème majeur des anastomoses intrathoraciques a été les symptômes en rapport avec le reflux gastro-oesophagien, responsables d'insomnie et d'une détérioration de la fonction sociale et physique. Cette étude a démontré que l'évaluation de la qualité de vie avec des instruments de mesure spécifiques

et généraux est utile pour distinguer entre des procédés chirurgicaux lorsque les paramètres standard tels que la survie sont limités.

Resumen. La supervivencia postoperatoria y las tasas de complicaciones han sido los parámetros estándar de resultados en cirugía oncológica. Son escasos los estudios sobre calidad de vida en tumores asociados con pobre supervivencia, como es el caso del cáncer esofágico. Los objetivos del presente estudio fueron determinar resultados en términos de calidad de vida en pacientes con cáncer esofágico, investigando las diferencias entre los dos procedimientos quirúrgicos de reconstrucción: la anastomosis intratorácica o la anastomosis cervical. Ciento ocho pacientes con cáncer esofágico fueron sometidos a tratamiento quirúrgico en nuestro departamento entre 1992 y 2000. La supervivencia media fue de 36 meses, sin diferencias significativas entre los pacientes en que se hizo anastomosis intratorácica o cervical. Una vez determinado el estado de supervivencia, se envió un cuestionario sobre Calidad de Vida a todos los pacientes a los dos años después de efectuada la cirugía. Se recibió respuesta de 46, los que fueron divididos entre el grupo de anastomosis intratorácica ($n = 24$) y anastomosis cervical ($n = 22$). Los pacientes con la anastomosis cervical mostraron mejor función física y social, así como un mejor estado general de salud. Desde el punto de vista de la calidad de vida, se encontró que los síntomas de reflujo constituyeron el mayor problema en los pacientes con anastomosis intratorácica, síntomas que causan insomnio significativo y desarreglo funcional físico y social. El estudio demuestra que la evaluación de la calidad de vida mediante instrumentos específicos o de carácter general es útil para determinar diferencias en los resultados de los procedimientos quirúrgicos para lo cual los parámetros estándar, tales como la tasa de supervivencia tienen limitaciones.

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