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Original Research Article

Exploring the role of quality of life in surgical decision making for patients undergoing pancreatectomy

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A B S T R A C T

Introduction: The influence of baseline health-related quality of life (HRQoL) on peri-operative outcomes in pancreatobiliary (PB) patients is not well established. This study investigated the impact of baseline HRQoL on peri-operative outcomes and the effect of surgery on HRQoL.
Methods: A secondary post-hoc analysis of a multicenter trial (2011–2016) assessed PB patients undergoing pancreatectomy. Pre-operative and 30-day post-operative FACT-G surveys were analyzed. Logistic regressions determined associations between baseline HRQoL scores and 60-day major complications. Subgroup analysis evaluated change in HRQoL (pre-operative to 30-day scores).
Results: Among 391 patients, higher baseline HRQoL (FACT-G overall OR 0.54,p = 0.04) was associated with decreased likelihood of developing major complications. Surgery resulted in improvement in HRQoL for patients with chronic pancreatitis (10.2 points) compared to other pathologies (−7 to 3.9 points).
Conclusion: Baseline HRQoL was associated with post-operative complications and HRQoL significantly improved for patients with chronic pancreatitis, highlighting the importance of HRQoL on patient-centered outcomes.

1. Introduction

A patient's health-related quality of life (HRQoL) is influenced by multiple factors, including physical well-being, functional ability, and psychosocial distress.[1,2] Patients with both benign and malignant disease, including gastrointestinal, breast, lung, and gynecologic malignancies, have been found to suffer from decreased HRQoL secondary to increased pain, anxiety, and distress from their disease burden and required treatments.[3–6] In particular, patients with pancreatobiliary (PB) disease suffer from high rates of distress and poor overall HRQoL.[3,7,8]

Due to the significant prevalence of impaired HRQoL amongst cancer patients, the American College of Surgeons Commission on Cancer issued psychosocial distress screening standards for CoC institutions to maintain accreditation.[9] To measure HRQoL and psychosocial distress, institutions have utilized different kinds of patient reported outcome measures including the Functional Assessment of Cancer Therapy – General Survey (FACT-G). Prior studies have established that baseline HRQoL scores can provide significant prognostic information regarding long-term survival in pancreatobiliary patients.[10–12] However, there

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have been mixed findings regarding the impact of pre-operative HRQoL on post-operative complications.[3,10] Additionally, there remains debate about the benefit that PB surgery can have on immediate post-operative HRQoL, particularly amongst patients with benign disease such as chronic pancreatitis.[13,14] Early studies found that surgical resection of chronic pancreatitis yielded mixed results, with as low as 40 % of patients obtaining pain and symptomatic relief.[15] However, more recently, randomized controlled trials have established early surgery as favorable compared to endoscopic drainage with both resection and drainage procedures improving pain and quality of life.[15–20]

As pre-operative HRQoL has been found to be associated with complications in cohorts of gynecologic and colorectal cancer patients, we sought to analyze how baseline HRQoL is associated with immediate post-operative complications in patients undergoing surgical resection for benign or malignant PB disease.[21,22] Additionally, we aimed to identify whether surgery is associated with improved HRQoL among specific PB disease groups. We hypothesized that lower baseline HRQoL would be associated with increased frequency of major complications. Moreover, we predicted that patients with low baseline HRQoL due to diseases causing significant symptom burden, like pancreatitis, would experience greater QoL improvements post-surgery compared to those with less symptomatic conditions like incidental cystic lesions and pancreatic neuroendocrine tumors (PNETs).

2. Methods

2.1. Data source, patient population, and study ethics

Patients diagnosed with benign and malignant PB diseases who participated in a prior multicenter randomized prospective clinical trial (clinicaltrials.gov; NCT01441492) that included 14 academic, high volume (~50 pancreatoduodenectomies/year) pancreas surgery centers in the United States and Canada were included in our study.[23] All patients underwent pancreaticoduodenectomy (Whipple) or distal pancreatectomy between 2011 and 2016 and were randomized for surgery with or without the use of routine intraperitoneal drainage. The index trial protocol was approved by the institutional review boards of the participating institutions as well as corresponding regulatory organizations. The current post-hoc secondary analysis of data obtained by the previous multicenter randomized controlled trial was approved by the Baylor College of Medicine's Institutional Review Board. Patients who did not complete pre-operative or post-operative FACT-G survey data were excluded from this analysis; however, patients who completed pre-operative FACT-G survey but were unable to complete the post-operative survey due to death within 30 days were included for analysis.

2.2. Quality of life assessment

All patients completed validated FACT-G surveys at the time of enrollment in the trial and at 30 days following surgery, a time period that has been previously used to evaluate post-operative QoL in gastrointestinal cancer patients.[24–28] The FACT-G survey is a 27-item survey that utilizes a five-point Likert scale with responses ranging from 0 (“not at all”) to 4 (“very much”). The FACT-G questionnaire consists of four primary domains of well-being: social, functional, emotional, and physical. Each domain has a sub-score, social (28 points), functional (28 points), emotional (24 points), and physical (28 points), with the sum of the domains being the total FACT-G score (108 points). Higher scores in the FACT-G overall scale and in the sub-domains indicate a better quality of life for the respondent. The FACT-G survey has been utilized in patients with cancer and with benign chronic illnesses and has been studied in general populations as well.[29–32]

After analyzing the distribution of patient FACT-G HRQoL scores, patients were divided into quintiles based on HRQoL score, with patients in lowest quintile of HRQoL scores having the lowest reported quality of life, and patients in the highest quintile of HRQoL scores having the best reported quality of life. Median scores in each quintile differed by greater than 8 points, indicating a clinically meaningful difference in scores.[24,26]

Change in HRQoL was measured by obtaining the difference between the pre-operative response and the 30-day post-operative FACT-G survey results.

2.3. Outcomes of interest

Outcomes of interest included post-operative complications noted within the first 60 days. In the original trial, complications were recorded from patient discharge summaries, hospital progress notes, laboratory reports, and outpatient progress notes. Complications within 60 days post-operatively were recorded and graded using the U.S. Department of Health and Human Services Common Terminology Criteria for Adverse Events (v4.0) which provides a standardized classification of post-operative adverse events.[33]

For this study, major complications were defined as Grade III or greater. Any complication was defined as an adverse event Grade I or greater. Postoperative pancreatic fistulas and leaks (POPF) were defined as Grades B and C fistulas according to the International Study Group of Pancreatic Fistula (ISGPS).[34] Post-operative mortality was defined as death within 30 days of patient's index procedure.

2.4. Statistical analysis

Parametric data was presented as means with standard deviations (SD) and non-parametric data was expressed as medians with interquartile ranges (IQR). Continuous variable parametricity was evaluated using Shapiro-Wilk's test and Kolmogorov-Smirnov test. Patients in the top four quintiles of HRQoL scores were compared to patients in the bottom quintile of HRQoL scores. This approach was chosen due to a meaningful difference in quality of life between these groups, allowing us to contrast those with the poorest HRQoL against the broader cohort. For clarity and practical application in clinical settings, we felt it would be more straightforward to identify patients with the lowest scores rather than distinguishing between individual quintiles or by individual total scores using a continuous variable.

Patient, tumor, and surgery characteristics between the high and low quality of life cohorts were compared using chi-squared or Fisher's exact tests for categorical variables and *t*-test for parametric continuous variables and Kruskal-Wallis tests for non-parametric continuous variables.

Throughout analysis, pancreatic neuroendocrine tumors were not included in the “Malignant” sub-group as these are typically indolent in their clinical behavior compared to pancreatic ductal adenocarcinomas, ampullary adenocarcinomas, and cholangiocarcinomas. Furthermore, they are typically diagnosed at a younger age, more well-differentiated, and at an earlier stage with greater five-year cause specific survival.[35,36] Multivariable logistic regression analysis was utilized to determine likelihood of major complications based on overall HRQoL scores and HRQoL subdomains. Regression analysis adjusted for disease pathology, sociodemographic factors, and co-morbidities, including hypertension, coronary artery disease, diabetes mellitus, renal insufficiency, peripheral vascular disease, BMI, and tobacco use. To ensure a thorough investigation of the HRQoL results, we also performed a sensitivity analysis in which patients in the top quintile were compared to patients in the bottom four quintiles.

Changes in HRQoL scores were plotted in caterpillar and spider plots and pre-operative and post-operative HRQoL scores were stratified by disease type with the change shown over time. Patients who died within 30-days of surgery and were unable to complete post-operative surveys were not included in the analysis comparing QoL scores over time. With our sample size of 385 patients with pre- and post-operative HRQoL survey results, we expected to have a sample size with large enough

power to investigate the changes in QoL by disease site. Data were analyzed using STATA SE Version 17.0 (StataCorp LP. College Station, Texas, USA). Statistical significance was considered with p values < 0.05.

3. Results

3.1. Patient, disease, and surgery characteristics

A total of 391 out of 497 patients enrolled in the randomized controlled trial were included in the secondary analysis. There were 161 patients with malignancy (41.2 %), 80 patients with pancreatic neuroendocrine tumors (20.5 %), 121 patients with cystic disease (30.9 %), and 29 patients with chronic pancreatitis (7.4 %). To evaluate the influence of HRQoL scores on clinical endpoints, patients were divided into quintiles based on FACT-G scores. Median pre-operative FACT-G total and sub-domain scores based on quintile cohorts demonstrated patient groups with progressively lower and non-overlapping scores that were significantly different from one another ($p < 0.001$) (Table 1). Patient, disease, and surgery characteristics for patients in the top four quintiles and the bottom quintile of HRQoL scores are noted in Table 2. There was a significant difference in median age between the high and low HRQoL cohorts (median age 66 in high HRQoL group, 58 in low HRQoL group, $p < 0.001$). The high HRQoL cohort had a significantly higher proportion of patients with malignant disease (44.1 % vs 30.0 %, $p < 0.001$). Additionally, there was no significant difference in the proportion of procedures between the two groups ($p = 0.29$).

Table 2
Patient, tumor, and surgery characteristics stratified by pre-operative FACT-G health-related quality of life scores.

Characteristics	Top Four Quintiles (n = 311)	Bottom Quintile (n = 80)	P Value
Age (median, IQR)	66 (58–73)	58 (51–70)	<0.001
Sex (n, %)			0.21
Males	141 (45.3)	30 (37.5)	
Females	170 (54.7)	50 (62.5)	
Race (n, %)			0.20
White	235 (75.6)	67 (83.8)	
Black	38 (12.2)	9 (11.3)	
Other	12 (3.9)	0 (0.0)	
Unknown/Not Reported	26 (8.4)	4 (5.0)	
Diagnosis (n, %)			<0.001
Pancreatic Ductal Adenocarcinoma, Ampullary Adenocarcinoma, Cholangiocarcinomas	137 (44.1)	24 (30.0)	
Pancreatic Neuroendocrine Tumor	68 (21.9)	12 (15.0)	
Cystic Disease	94 (30.2)	27 (33.8)	
Pancreatitis	12 (3.9)	17 (21.3)	
Procedure (n, %)			0.29
Open Distal Pancreatectomy	110 (35.4)	30 (37.5)	
Laparoscopic Distal Pancreatectomy	115 (37.0)	22 (27.5)	
Open Pancreaticoduodenectomy	75 (24.1)	24 (30.0)	
Laparoscopic Pancreaticoduodenectomy	11 (3.5)	4 (5.0)	

3.2. Analysis of health-related quality of life scores on post-operative outcomes

Short-term post-operative outcomes are displayed in Table 3. Patients in the low HRQOL group had a higher proportion of any complication (68.8 % vs 53.7 %, $p = 0.02$) compared to the high HRQoL group. There was no difference in the frequency of major grade 3+ complications between the two groups ($p = 0.07$). Additionally, there was no association between type of surgical resection in Whipples versus distal pancreatectomies ($p = 0.32$) or utilization of minimally invasive approach ($p = 0.37$) with development of major complications. There were no differences in frequencies of POPF ($p = 0.13$), wound complications ($p = 0.06$), intra-abdominal abscesses ($p = 0.71$), organ failure ($p = 0.54$), and 30-day mortality ($p = 0.61$). When evaluating post-operative outcomes by disease type (malignancy, PNET, cystic lesion, pancreatitis), there were no differences in the frequency of overall complications ($p = 0.28$) or major complications ($p = 0.33$).

On multivariable logistic regression analysis after accounting for patient, disease, and surgery factors, patients with HRQoL scores in the top four quintiles were compared to those with scores in the bottom quintile in the overall FACT-G survey and sub-domains. While there was no difference in chi-squared analysis when comparing the two groups, multivariable analysis demonstrated that high HRQoL scores in the overall FACT-G survey (OR 0.54, 95 % CI 0.30–0.97, $p = 0.04$), in the physical subdomain (OR 0.53, 95 % CI 0.30–0.95, $p = 0.03$), and in the functional subdomain (OR 0.46, 95 % CI 0.27–0.79, $p = 0.005$) were associated with decreased likelihood of developing of major complications (Table 4). Quality of life scores in the emotional ($p = 0.88$) and social subdomains ($p = 0.71$) were not associated with development of major complications.

Table 3
Post-operative complications stratified by pre-operative FACT-G health-related quality of life scores.

Post-operative Outcome (n, %)	Top Four Quintiles (n = 311)	Bottom Quintile (n = 80)	P Value
Any Complication	167 (53.7)	55 (68.8)	0.02
Grade 3+ Major Complication	71 (22.8)	26 (32.5)	0.07
POPF[a]	37 (11.9)	14 (17.5)	0.13
Wound Complication (Infection/Dehiscence)	17 (5.5)	9 (11.3)	0.06
Intra-Abdominal Abscess	30 (9.6)	10 (12.5)	0.71
Organ Failure[b]	15 (4.8)	2 (2.5)	0.54
Death[c]	4 (1.3)	2 (2.5)	0.61

[a] Grade B and C Pancreatic Leak/Fistula.
[b] Organ failure includes Acute Respiratory Distress Syndrome, Hepatic Failure, and Renal Failure.
[c] Death within 30 days of operation.

Table 1
Health-related Quality of Life Scores for cohort when divided into quintiles based on FACT-G scores.

Characteristic	Top Quintile (n = 77)	2nd Quintile (n = 79)	3rd Quintile (n = 78)	4th Quintile (n = 77)	Top Four Quintiles Combined (n = 311)	Bottom Quintile (n = 80)
Pre-operative HRQoL Scores[a] *(Median, IQR)*						
Total FACT-G	93 (91–95.7)	84 (82–86)	76 (72.7–78)	65 (63–67.7)	79.2 (70–87.7)	50.7 (44.2–55.7)
Physical Well-Being	27 (26–28)	26 (23–28)	23 (20–25)	19 (14–23)	25 (21–27)	11 (8–15)
Emotional Well-Being	21 (20–23)	19 (17–21)	18 (14–20)	15 (12–18)	19 (15–21)	11.5 (7–15.5)
Social/Family Well-Being	19 (18–20)	18 (16–19)	17 (14–19)	16.3 (14–19)	18 (16–19)	17 (15–19.7)
Functional Well-Being	27 (25–28)	23 (21–25)	19 (17–21)	15 (12–18)	21 (17–25)	9 (6–12)

$P < 0.001$ in comparisons between all quintiles and when comparing top four quintiles to bottom quintile.
[a] Based on survey scoring guidelines, higher scores correspond to higher HRQoL.

Table 4
Logistic Regression Denoting Likelihood of Development of Major complication By FACT-G Health-Related Quality of Life Score.

Covariate[a]	OR	95 % CI	P Value
Bottom Quintile QOL FACTG	Ref		
Top Four Quintiles FACTG	0.54	0.30–0.97	0.04
Bottom Quintile Physical	Ref		
Top Four Quintiles Physical	0.53	0.30–0.95	0.03
Bottom Quintile Emotional	Ref		
Top Four Quintiles Emotional	0.96	0.54–1.71	0.88
Bottom Quintile Functional	Ref		
Top Four Quintiles Functional	0.46	0.27–0.79	0.005
Bottom Quintile Social	Ref		
Top Four Quintiles Social	1.11	0.63–1.96	0.71

[a] Represents separate multivariate logistic regression model for each HRQoL score/sub-domain.

In a separate analysis comparing patients in the top quintile of HRQoL scores to patients in the bottom four quintiles, there were no significant associations between overall or sub-domain QoL scores and development of major complications (Supplemental Table 1).

3.3. Change in health-related quality of life scores post-operatively

As 6 patient died within 30 days of surgery, a total of 385 patients completed pre- and post-operative surveys for analysis. Changes in overall FACT-G HRQoL scores from before and after surgery were stratified by disease type are shown in Fig. 1. Caterpillar plots illustrate changes in HRQoL scores in ascending order. Patients with malignant disease had changes in HRQoL scores ranging from −75 to 35, those with PNETs had a range from −48.2 to 33.7, those with cystic disease had a range from −49.1 to 53, and those with pancreatitis had a range from −14.6 to 33. Major complications were relatively evenly distributed throughout the caterpillar plots for patients with malignant disease, PNETs, and cystic disease.

The median change in HRQoL was significantly different between patients with and without major complications (−6 with major complications, −1 without major complications; $p = 0.004$). There were no significant changes in HRQoL related to major complications for patients with malignancy ($p = 0.21$), PNETs ($p = 0.33$), or cystic disease ($p = 0.15$). However, among patients with pancreatitis, the median change in HRQoL was significantly worse for those who experienced major complications ($p = 0.01$). Patients with chronic pancreatitis with major complications experienced a 4.6-point decrease in HRQoL scores, while those without major complications saw an 11-point improvement following surgery. There were no differences in change in HRQoL by type of surgery ($p = 0.26$) or by surgical approach ($p = 0.70$).

Composite changes in FACT-G HRQoL scores (pre-to post-operative) stratified by disease type are denoted in Fig. 2. Patients with malignant disease were found to have a decrease in FACT-G by 3 points (75 pre-operative, 72 at 30 days). Patients with PNETs were found to experience a significant decrease in HRQoL following surgery (81 pre-operative, 74 at 30 days; $p < 0.001$). Patients with pancreatitis experienced the greatest increase in HRQoL (57 pre-operative, 67 at 30 days; $p < 0.001$). Subgroup analysis of pancreatitis patients demonstrated that

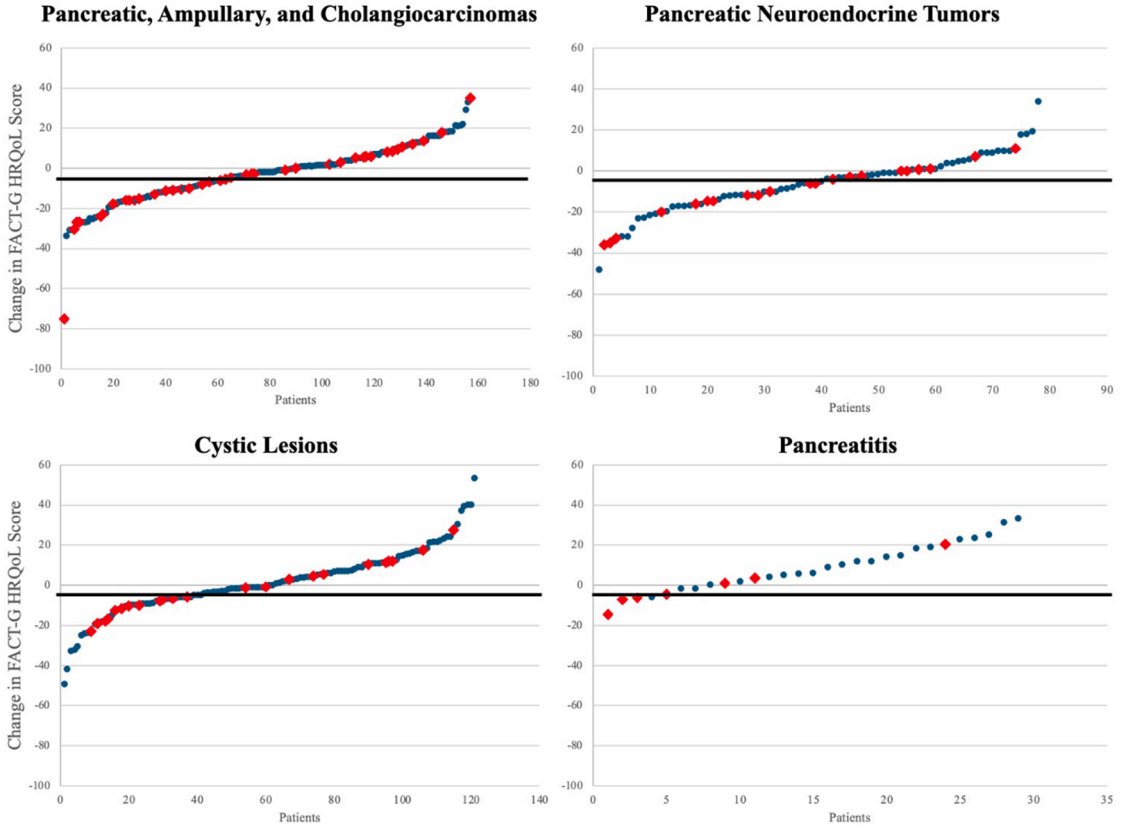

Fig. 1. Caterpillar plot denoting change in FACT-G health-related quality of life at 30-days post-operatively stratified by disease site and denoting major complications (N = 385[a]).

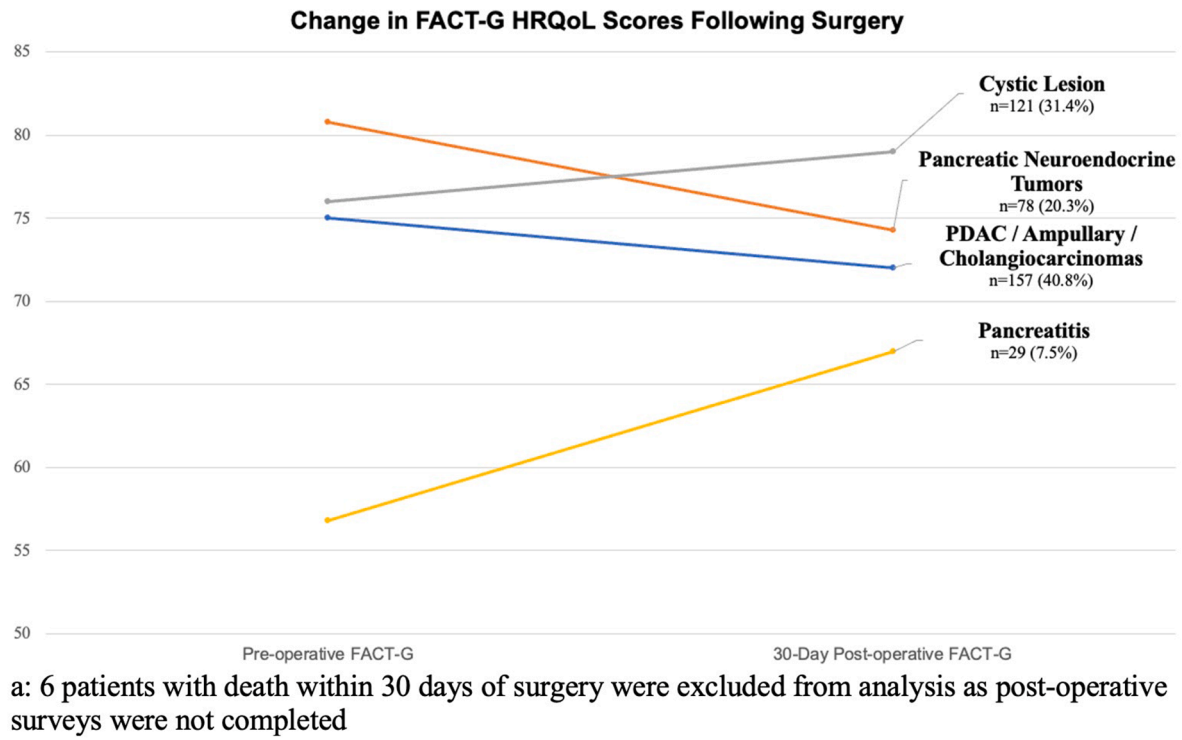

Fig. 2. Change in FACT-G health-related quality of life scores following surgery stratified by disease type (N = 385[a]).

there were no differences in the improvement in HRQoL based on receipt of Whipple versus distal pancreatectomy (median improvement in FACT-G score 6 points (IQR 3.6–19) for Whipple, 7 points (IQR -3.3 – 16.5) for distal pancreatectomy; p = 0.49) or minimally invasive approach (9 points (IQR 1.9–19) for open approach, 1 point for MIS (IQR -5.3 – 13.5); p = 0.24). Spider plots denoting HRQoL scores by disease type are shown in Supplemental Fig. 1.

4. Discussion

This study features one of the largest multi-institutional cohorts of pancreatectomy patients with patient reported pre-operative and post-operative HRQoL scores. In our secondary analysis of a prior multi-center randomized controlled study, we found that pre-operative FACT-G scores – and the functional and physical sub-domains - were associated with post-operative major complications. Major complications were associated with a decrease in HRQoL, however they were also prevalent among patients who saw improvements in HRQoL after surgery. Baseline HRQoL scores were influenced by disease type, with chronic pancreatitis patients exhibiting the lowest pre-operative HRQoL. Following surgical resection, patients with pancreatitis experienced the greatest improvement in HRQoL compared to those with other benign and malignant diseases.

Prior studies have established the prognostic value of baseline HRQoL on survival outcomes throughout a multitude of cancer cohorts including patients with breast, gastro-esophageal, lung, and hepatopancreatobiliary cancers.[10,37–40] However, the impact of pre-operative well-being on short-term outcomes remains unclear as previous studies have not shown a significant correlation.[3,10] Our study demonstrates an association between baseline overall HRQoL and major post-operative complications, even after accounting for disease pathology and the type of surgery. This aligns with findings from similar studies involving cohorts of gynecologic and colorectal cancer patients.[21,22] An association between baseline HRQoL and short-term complications provides clinicians with additional data regarding pre-operative risk stratification and decision making for potential surgical patients. Just as Eastern Cooperative Oncology Group (ECOG) performance status and nutritional status have been shown to be prognostic for peri-operative outcomes,[41,42] pre-operative HRQoL may have similar prognostic value that should be accounted for by clinicians. Moreover, these pre-operative assessments should not be viewed in isolation. Poor nutritional or performance status likely contributes to diminished well-being and heightened psychosocial distress, as demonstrated by a prior study which found that pre-operative quality of life was associated with pre-operative frailty.[43] Therefore, HRQOL assessments, such as the FACT-G survey, offer clinicians another tool for pre-operative evaluation of potential surgical candidates and may serve as an indication for psychosocial interventions aimed at reducing the likelihood of post-operative complications.

A key finding of this analysis is that patients with lower HRQoL were significantly younger compared to those with higher HRQoL. Previous studies have similarly observed that younger patients with pancreatic ductal adenocarcinoma, as well as other cancer diagnoses, experience higher levels of anxiety and report poorer mental health quality of life compared to older patients.[38,44] This phenomenon may be explained by the greater disruption a cancer diagnosis poses to younger individuals.[44] Older patients, who often already face physical impairments prior to diagnosis, may be better equipped to cope with a cancer diagnosis. Future research should further explore the impact of age on patient-reported outcomes and downstream complication rates, particularly in pancreatic disorders. Gaining a deeper understanding of how age influences patient experiences could help tailor interventions to enhance overall patient care and quality of life.

In our sensitivity analysis, we found that patients in the bottom four quintiles of HRQoL scores, when compared to those in the highest quintile, were not significantly associated with the development of major complications. Interestingly, while patients in the lowest quintile did show a significant association with complications, this association did not extend to the broader group comprising the bottom four quintiles. This disparity suggests that additional factors – such as increased frailty or poorer nutritional and functional performance – may distinguish patients in the lowest quintile from those in the broader lower-

scoring group. These findings highlight the potential value of targeted psychosocial interventions for patients with the lowest baseline HRQoL scores as a means to improve clinical outcomes. Interventions ranging from pre-rehabilitation to psychological and nutritional support have shown promising results in improving quality of life and reducing anxiety, depression, and cancer-related fatigue in select colorectal and HPB cancer populations.[45–48] Thus, this study provides a unique insight into the subset of patients that should potentially be targeted in future trials or studies. Subsequent prospective trials and studies may beneft from targeting patients with low baseline FACT-G scores and assigning them to nutritional, rehabilitative, or psychosocial support based on the their FACT-G and sub-category results.

The surgical decision-making process encompasses myriad factors, with the primary objective being to either enhance a patient's survival or their quality of life. For patients with malignant or pre-malignant lesions, surgery is frequently essential for enhancing long-term survival, even if it entails a temporary decline in quality of life. Conversely, for patients with benign diseases like chronic pancreatitis, surgery may not necessarily improve overall survival. Instead, the aim is to improve a patient's HRQoL by addressing their significant symptom burden. Prior studies have shown that patients with chronic pancreatitis suffer from considerable pain, resulting in a markedly lower HRQoL compared to those with other benign and malignant PB diseases.[3,7,8] Similarly, our study found that patients with chronic pancreatitis suffered from poorer HRQoL compared to those with benign cystic lesions, PNETs, or malignancies. However, this same group of patients experienced a statistically significant improvement in HRQoL following pancreatic surgery, whereas patients with other conditions experienced either minimal improvement or significant declines in HRQoL. This improvement in quality of life, particularly in physical well-being, amongst patients with chronic pancreatitis is concordant with a prior single-institution study which evaluated 168 patients with chronic pancreatitis who underwent pancreaticoduodenectomy.[49]

Various surgical procedures have been employed in the treatment of chronic pancreatitis. These include resection procedures like the Whipple procedure or distal pancreatectomy, drainage procedures such as the Puestow procedure, or a combination of both resection and drainage such as the Beger and Frey procedures. While prior studies have compared the different surgical techniques, our study, which only featured patients undergoing Whipples and distal pancreatectomies, found no significant difference in the improvement in HRQoL among chronic pancreatitis patients based on the type of surgical resection performed.[18] Patients with chronic pancreatitis experienced an improvement in well-being regardless of the procedure or utilization of minimally invasive techniques. This finding suggests that patients were appropriately selected for surgery due to a significant symptom burden that may improve with surgical management. While our study cannot provide insights into the pre-operative discussions between patients and the surgical team, it does suggest that surgery may be a potential treatment modality in improving poor baseline HRQoL in this subgroup of patients. A recent prospective multicenter study of patients undergoing surgery for chronic pancreatitis demonstrated significant improvements in Izbicki pain scores within the first postoperative month, with continued improvements in pain relief observed through six months. Notably, the study utilized different quality of life assessment tools—including the Pancreatitis Quality of Life Instrument (PANQOLI) and the 12-Item Short Form Survey (SF-12)—and included surgical drainage procedures in addition to pancreatectomies, in contrast to our study, which focused exclusively on pancreatectomy.[50]

Our results demonstrate that surgical resection has a variable impact on quality of life depending on the disease being treated. On one hand, patients with cystic lesions in our study experienced a slight increase in HRQoL following surgery. This finding aligns with a recent cohort study which found that patients with resected cystic lesions were highly satisfied following their surgery, reporting that post-operative surgical changes outweighed their pre-surgical anxiety and distress.[51] Additionally, patients with PNETs and malignant disease experienced a significant decrease in HRQoL following surgery. For patients with PNETs, these results are not surprising as patients are often diagnosed incidentally through imaging findings without any notable symptoms.[52,53] In patients with malignant disease, the primary goal of surgery is typically focused on removal of tumor rather than qualitative improvements in well-being and HRQoL. While there is a decrease in QoL following surgery in these patients, the limited follow-up in our cohort may only be capturing the immediate post-operative period during which patients are experiencing pain, fear, and trepidation, particularly with a cancer diagnosis. These patients may eventually experience a rebound in their HRQoL, as has been noted in a previous systematic review evaluating patients who underwent pancreatic surgery.[14]

This study has notable limitations. The analysis is retrospective in nature and was not the primary outcome of interest in the original randomized controlled trial. However, patient HRQoL and clinical data were collected prospectively by multiple high-volume pancreas centers. Only patients who completed both pre- and post-operative FACT-G surveys were included, introducing potential selection bias. Additionally, post-operative surveys were limited to immediate follow-up at 30 days; there were not any surveys conducted at more distant follow-up times. The original trial obtained complication and mortality data up to 60 days post-operatively, a follow-up period slightly shorter than the ideal 90 day post-operative period to evaluate post-operative pancreatectomy patients. Subsequent prospective studies would benefit from obtaining HRQoL scores and outcomes data at more distant follow-up periods months following surgical resection. Lastly, staging and tumor size data were unavailable, limiting our ability to control for pre-operative disease burden. Nonetheless, this study represents a large multi-institutional cohort of patients with both benign and malignant disease, suggesting these results may be generalizable to other settings.

5. Conclusion

Among pancreatectomy patients, baseline overall, physical, and functional HRQoL were associated with surgical outcomes and the development of post-operative complications. Following surgery, HRQoL was improved for patients with pancreatitis but relatively unchanged for patients with malignant disease. Taken together, these findings can inform patients and surgeons about expected patient centered outcomes for major pancreatic surgery and provide a profile of quality of life in association with both a complicated and uncomplicated postoperative course.

CRediT authorship contribution statement

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.amjsurg.2025.116523.

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