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Postoperative distress and influencing factors in patients with pancreaticobiliary cancer

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This study aimed to investigate distress levels, using the distress thermometer (DT), and the factors associated with distress in postoperative patients with pancreaticobiliary cancer. This study retrospectively investigated 155 patients who underwent surgery for pancreaticobiliary cancer between December 1, 2019 and September 30, 2021. The DT and problem list were used to measure distress. Descriptive statistics, t-test, and multivariate logistic regression analysis were used to analyze the data. Of the 155 patients, 16.8% (n = 26) and 83.2% (n = 129) were in the mild-distress and moderate-to-severe distress groups, respectively. The average DT score was 6.21; that for the mild-distress and moderate-to-severe distress groups was 2.46 and 6.97, respectively. More patients in the moderate-to-severe distress group reported having problems of “sadness” ($\chi^2 = 4.538$, $P < 0.05$), “indigestion” ($\chi^2 = 10.128$, $P < 0.001$), “eating” ($\chi^2 = 6.147$, $P < 0.013$), and “getting around” ($\chi^2 = 4.275$, $P < 0.039$) than in the mild-distress group. In addition, occupation status (odds ratio [OR] = 0.342, 95% confidence interval [CI] = 0.133–0.879, $P = 0.026$) and indigestion (OR = 5.897, 95% CI = 1.647–21.111, $P = 0.006$) were independent risk factors for the presence of severe distress. Patients with pancreaticobiliary cancer demonstrated elevated levels of psychological distress. Healthcare providers should therefore be vigilant when evaluating patients for distress and providing appropriate referrals, particularly those who are unemployed or have indigestion.

Keywords Distress, Pancreatectomy, Pancreatobiliary cancer, Postoperative patients, Psychological distress

Distress is important in identifying cancer and cancer-related physical symptoms and providing effective treatment. It is a general term for unpleasant emotional experiences that are multifactorial, psychological (including cognitive, behavioral, and emotional), social, and spiritual and interfere with the ability to cope^{1–3}. NCCN guidelines suggest measuring distress levels using the distress thermometer (DT)¹. The DT includes several items on physical, emotional, social, practical, and spiritual concerns. Distress can affect how a patient thinks, feels, and acts.

The prevalence of distress in patients with cancer is reported to be 35–52%, although there are some differences depending on the evaluation period or evaluation tool used⁴. Pancreatobiliary cancer is a malignancy with one of the worst prognoses, and many patients suffer from severe psychological distress because they have a negative view of treatment⁵. In cases of treatment for pancreaticobiliary cancer, especially pancreaticoduodenectomy, surgeries have high morbidity and mortality rates and longer hospital stays, which cause physiological problems^{6,7}. Therefore, in addition to the distress caused by cancer, distress due to surgical treatment has a significant impact on patients' quality of life^{8,9}.

Several studies have reported that the level of distress in patients with pancreatic cancer is relatively high compared to that in patients with other cancers^{10–12}. According to a meta-analysis by Barnes et al., approximately 43% of patients with pancreatic cancer reported experiencing depression after diagnosis¹³.

The Mayo Clinic evaluated patients with abdominal symptoms after surgical resection and found that 76% of patients with pancreatic cancer had symptoms of depression and anxiety, compared to 20% of patients with other tumors¹⁴. Thus, patients with pancreatic cancer have a high risk of developing psychosocial distress. Additionally, in one study, 30% of patients with periampullary cancer had a DT score higher than 5 points, and pancreatic adenocarcinoma patients reported the highest levels of distress¹⁵.

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The first step toward providing psychosocial support to patients is the assessment of distress¹⁶. Therefore, this study aimed to investigate the level of distress, using the DT, and the factors, particularly occupation associated with distress in postoperative patients with pancreaticobiliary cancer.

Methods

Patients

This study retrospectively investigated 208 patients who underwent surgery for pancreaticobiliary cancer between December 1, 2019 and September 30, 2021. Following the exclusion of 53 patients with missing patient information and treatment records, or who had difficulty filling out the questionnaire, a total of 155 patients were included. Distress was measured by one researcher between 7 and 10 days after surgery. This study was approved by the Institutional Review Board of Gangnam Severance Hospital (approval no. 3-2021-0449). The procedures used in this study adhere to the tenets of the Declaration of Helsinki. Informed consent was obtained from all the patients included in the study.

Distress measurement

Distress was measured using the DT and Problem List (PL) tools developed by the NCCN. The DT, a brief 0–10 visual analog scale, was developed to routinely assess distress levels in patients with cancer. Possible problems in multiple domains, including physical, emotional, spiritual, family, and practical (39 problems), were assessed using PL tools.

Patients with a distress score of < 4 were classified into the mild-distress group, and those with a score of ≥ 4 were classified into the moderate-to-severe distress group.

Statistical analysis

The clinical characteristics and variables of the DT were compared for any differences, and the significance of the differences was evaluated using a paired t-test.

Continuous variables including age and distress scores are presented as mean \pm standard deviation (SD) and were compared using Student's t-test. Categorical variables, including sex, marital status, education, main caregiver, religion, occupation status, pathological and surgical characteristics, and problem lists, were expressed as counts and percentages and compared using Fisher's exact test. The results of this model were presented as odds ratios (ORs) with 95% confidence intervals (CIs) using multivariate logistic regression analysis. All statistical analyses were performed using SPSS software (version 27.0). A P value < 0.05 was considered statistically significant.

Ethics declarations

This study was approved by the Institutional Review Board of Gangnam Severance Hospital (approval no. 3-2021-0449). The procedures used in this study adhere to the tenets of the Declaration of Helsinki.

Results

General and clinical characteristics of the patients

A total of 155 patients were included in this study. The age range was 24–86 years, with an average age of 65.0 (± 12.06) years. Of the patients, 56.1% were males ($n = 87$) and 43.9% were females ($n = 68$). Additionally, 81.9% of the patients were married and 38.1% had a college degree or higher education. The main caregivers for 58.1% of the patients were spouses; 60.6% of patients had no religion and 55.5% were unemployed.

Regarding pathological findings, the most common types of cancers diagnosed were pancreatic cancer (62.6%), biliary tract cancer (28.4%), and ampulla of Vater cancer (9.0%). Regarding the disease stage, 31.6% of the patients had stage I, 34.8% had stage II, 30.3% had stage III, and 3.2% had stage IV. Moreover, 77.4% of patients underwent pancreaticoduodenectomy, which was the most frequently used surgical method, while 70.3% of patients did not undergo neoadjuvant chemotherapy. The average hospital stay after surgery was 12.23 (± 7.85) days, with most patients (60.0%) classified as Clavien–Dindo grade < I. According to the DT of all patients, sex ($\chi^2 = -2.844$, $P = 0.005$) and occupational status ($\chi^2 = 8.759$, $P = 0.004$) were statistically significant (male, 5.71 ± 2.58 ; female, 6.85 ± 2.29 ; no occupation, 6.73 ± 2.31 ; occupation, 5.56 ± 2.62). The number of patients who underwent neoadjuvant chemotherapy was statistically significant (upfront surgery, 6.53 ± 2.42 ; neoadjuvant chemotherapy, 5.46 ± 2.61 ; Table 1).

Distress level of patients

The 155 patients were divided into the mild-distress group ($n = 26$, 16.8%) and moderate-to-severe distress group ($n = 129$, 83.2%; Fig. 1). The average DT score was 6.21; the average score for the mild-distress group was 2.46 and that for the moderate-to-severe distress group was 6.97 (Fig. 2). There were more patients in the moderate-to-severe distress group, and the DT score was high (> 5 points).

Clinical characteristics of the two groups of patients according to distress severity

Table 3 shows the relationships between the distress groups according to the patients' PLs. In the mild-distress group, males (76.9%) experienced a higher level of distress than females (23.1%), and in the moderate-to-severe distress group, males (51.9%) and females (48.1%) suffered similar levels of distress ($\chi^2 = 5.486$, $P = 0.019$). In the mild-distress group, those with a job suffered more distress than those without a job, and in the moderate-to-severe distress group, those without a job suffered more distress than those with a job ($\chi^2 = 7.726$, $P < 0.005$; Table 2).

Variables	Categories	Total (n = 155)	Distress score	t or F (P)
		n(%)	M ± SD	Scheffé
Demographic characteristics				
Age (years)	20–59	41 (26.5)	6.31 ± 2.722	0.791 (0.455)
	60–69	54 (34.8)	5.87 ± 2.68	
	≥70	60 (38.7)	6.45 ± 2.21	
Sex	Male	87 (56.1)	5.71 ± 2.58	– 2.844 (0.005)
	Female	68 (43.9)	6.85 ± 2.29	
Marital status	Unmarried/divorced	28 (18.1)	6.41 ± 2.44	– 0.466 (0.642)
	Married	127 (81.9)	6.17 ± 2.54	
Education	≤Middle school graduation	39 (25.2)	6.67 ± 2.75	0.877 (0.418)
	High school graduation	57 (36.8)	6.01 ± 2.24	
	≥ University graduation	59 (38.1)	6.10 ± 2.62	
Main caregiver	Spouse	90 (58.1)	6.20 ± 2.72	0.160 (0.852)
	Children	52 (33.5)	6.14 ± 2.31	
	Others	13 (8.4)	6.58 ± 1.93	
Religion	No	94 (60.6)	6.43 ± 2.46	1.855 (0.175)
	Yes	61 (39.4)	5.87 ± 2.60	
Occupational status	No	86 (55.5)	6.73 ± 2.31	8.759 (0.004)
	Yes	69 (44.5)	5.56 ± 2.62	
Clinical characteristics				
Type of cancer	Pancreatic cancer	97 (62.6)	6.14 ± 2.53	1.672 (0.191)
	Bile duct cancer	44 (28.4)	5.99 ± 2.52	
	Ampulla of Vater cancer	14 (9.0)	7.36 ± 2.21	
Diagnostic stage	I	49 (31.6)	6.61 ± 2.26	0.699 (0.554)
	II	54 (34.8)	5.60 ± 2.68	
	III	47 (30.3)	6.00 ± 2.61	
	IV	5 (3.2)	6.60 ± 2.41	
Type of surgery	PD	120 (77.4)	6.20 ± 2.42	1.636 (0.183)
	DP	26 (16.8)	6.12 ± 2.67	
	Total pancreatectomy	7 (4.5)	5.71 ± 3.35	
	HPD	2 (1.3)	10.0 ± 0.0	
Neoadjuvant chemotherapy	No	109 (70.3)	6.53 ± 2.42	6.050 (0.015)
	Yes	46 (29.7)	5.46 ± 2.61	
CD grade	<I	93 (60.0)	6.24 ± 2.47	0.038 (0.846)
	≥II	62 (40.0)	6.16 ± 2.60	

Table 1. Distress score according to demographic and clinical characteristics of patients (n = 155). PD, pancreaticoduodenectomy; DP, distal pancreatectomy; HPD, Hepato-Pancreaticoduodenectomy; CD, Clavien–Dindo classification.

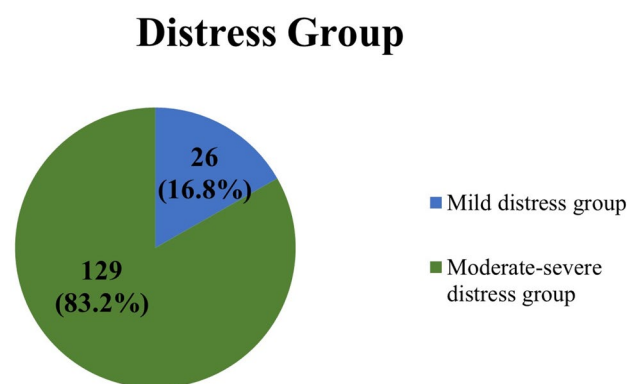


Figure 1. Distress group distribution of all patients.

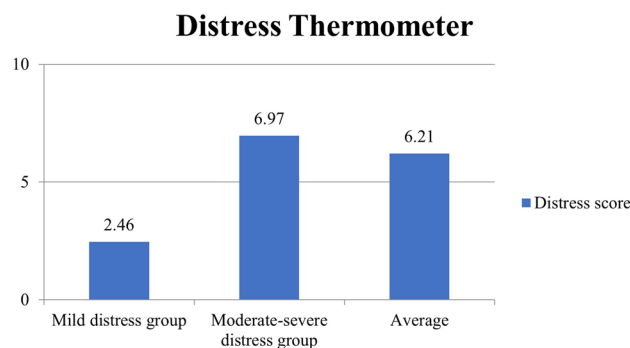


Figure 2. Average score by group measured by distress thermometer.

Variables	Categories	Mild-distress group (n = 26)	Moderate-to-severe distress group (n = 129)	χ^2 or t (P)
		N(%) or M \pm SD	N(%) or M \pm SD	
Demographic characteristics				
Age (years)		65.27 \pm 8.86	64.94 \pm 12.60	0.118 (0.906)
	20–59	7 (26.9)	34 (26.4)	2.272 (0.321)
	60–69	12 (46.2)	42 (32.6)	
	\geq 70	7 (26.9)	53 (41.1)	
Sex	Male	20 (76.9)	67 (51.9)	5.486 (0.019)
	Female	6 (23.1)	62 (48.1)	
Marital status	Unmarried/divorced	3 (11.5)	25 (19.4)	0.899 (0.416)
	Married	23 (88.5)	104 (80.6)	
Education	\leq Middle school graduation	4 (15.4)	35 (27.1)	2.396 (0.302)
	High school graduation	9 (34.6)	48 (37.2)	
	\geq University graduation	13 (50.0)	46 (35.7)	
Main caregiver	Spouse	19 (73.1)	71 (55.0)	4.241 (0.120)
	Children	7 (26.9)	45 (43.3)	
	Others	0 (0.0)	13 (10.1)	
Religion	No	14 (53.8)	80 (62.0)	0.605 (0.437)
	Yes	12 (46.2)	49 (38.0)	
Occupational status	No	8 (30.8)	78 (60.5)	7.726 (0.005)
	Yes	18 (69.2)	51 (39.5)	
Clinical characteristics				
Type of cancer	Pancreatic cancer	17 (65.4)	80 (62.0)	1.032 (0.597)
	Bile duct cancer	8 (30.8)	36 (27.9)	
	Ampulla of Vater cancer	1 (3.8)	13 (10.1)	
Diagnostic stage	I	6 (23.1)	43 (33.3)	2.878 (0.411)
	II	12 (46.2)	42 (32.6)	
	III	8 (30.8)	39 (30.2)	
	IV	0 (0.0)	5 (3.9)	
Type of surgery	PD	17 (65.4)	103 (79.8)	3.604 (0.308)
	DP	7 (26.9)	19 (14.7)	
	Total pancreatectomy	2 (7.7)	5 (3.9)	
	HPD	0 (0.0)	2 (1.6)	
Neoadjuvant chemotherapy	No	15 (57.7)	94 (72.9)	2.388 (0.122)
	Yes	11 (42.3)	35 (27.1)	
Postoperative LOS		10.04 \pm 5.21	12.67 \pm 8.23	– 1.565 (0.120)
CD grade	<I	17 (65.4)	76 (58.9)	0.377 (0.539)
	\geq II	9 (34.6)	53 (41.1)	

Table 2. Demographic and clinical characteristics of patients in the mild-distress and moderate-to-severe distress groups (n = 155). PD, pancreaticoduodenectomy; DP, distal pancreatectomy; HPD, Hepato-Pancreaticoduodenectomy; LOS, length of Hospital stay; CD, Clavien–Dindo classification.

Variables	Total (n = 155)	Mild-distress group (n = 26)		Moderate-to-severe distress group (n = 129)		χ^2 or t (P)
	N(%) or M \pm SD	N(%)	Ranking	N(%)	Ranking	
Practical domain						
Child-care	5(3.2)	1 (3.8)	11	4 (3.1)	25	0.039 (1.000) [†]
Housing	13 (8.4)	3 (11.5)	9	10 (7.8)	21	0.404 (0.459) [†]
Insurance/Financial	23 (14.8)	2 (7.7)	10	21 (16.3)	14	1.263 (0.370) [†]
Transportation	3 (1.9)	1 (3.8)	11	2 (1.6)	26	0.601 (0.426) [†]
Work	11 (7.1)	4 (15.4)	8	7 (5.4)	22	3.255 (0.090) [†]
Family problems						
Dealing with children	5 (3.2)	0 (0.0)	12	5 (3.9)	24	1.041 (0.590) [†]
Dealing with partner	8 (5.2)	3 (11.6)	9	5 (3.9)	24	2.596 (0.132) [†]
Ability to have children	0 (0.0)	0 (0.0)	12	0 (0.0)	27	–
Emotional problems						
Depression	27 (17.4)	2 (7.7)	10	25 (19.4)	12	2.055 (0.254) [†]
Nervousness	23 (14.8)	3 (11.5)	9	20 (15.5)	15	0.269 (0.768) [†]
Worry	74 (47.7)	11 (42.3)	2	63 (48.8)	3	0.370 (0.543)
Fears	70 (38.7)	9 (34.6)	4	51 (39.5)	6	0.221 (0.638)
Sadness	28 (18.1)	1 (3.8)	11	28 (21.7)	9	4.538 (0.050) [†]
Loss of interest in usual activities	32 (20.6)	5 (19.2)	7	27 (20.9)	10	0.038 (0.845)
Spiritual/religious concerns	4 (2.6)	0 (0.0)	12	4 (3.1)	25	0.828 (1.000) [†]
Physical problems						
Constipation	32 (20.6)	7 (26.9)	5	22 (19.4)	12	0.752 (0.386)
Diarrhea	36 (23.2)	6 (23.1)	6	30 (23.3)	8	0.00 (1.000)
Indigestion	61 (39.4)	3 (11.5)	9	58 (45.0)	4	10.128 (0.001)
Eating	57 (36.8)	4 (15.4)	8	53 (41.1)	5	6.147 (0.013)
Nausea	28 (18.1)	2 (7.7)	10	26 (20.2)	11	2.271 (0.168) [†]
Mouth sores	15 (9.7)	0 (0.0)	12	15 (11.6)	18	3.347 (0.077) [†]
Feeling swollen	17 (11.0)	1 (3.8)	11	16 (12.4)	17	1.623 (0.309) [†]
Pain	94 (60.6)	13 (50.0)	1	81 (62.8)	1	1.483 (0.223)
Tingling in hands/feet	14 (9.0)	4 (15.4)	8	7 (7.8)	21	1.534 (0.256) [†]
Sleep	77 (49.7)	10 (38.5)	3	67 (51.9)	2	1.572 (0.210)
Fatigue	35 (22.6)	4 (15.4)	8	31 (24.0)	7	0.925 (0.336)
Sexual	2 (1.3)	0 (0.0)	12	2 (1.6)	26	0.408 (1.000) [†]
Skin dry/itchy	24 (15.5)	5 (19.2)	7	19 (14.7)	16	0.335 (0.558) [†]
Appearance	15 (9.7)	3 (11.5)	9	12 (9.3)	20	0.124 (0.719) [†]
Memory/concentration	21 (13.5)	2 (7.7)	10	19 (14.7)	16	0.915 (0.531) [†]
Nose dry/congested	15 (9.7)	3 (11.5)	9	12 (9.3)	20	0.124 (0.719) [†]
Breathing	14 (9.0)	1 (3.8)	11	13 (10.1)	19	1.023 (0.467) [†]
Fevers	6 (3.9)	0 (0.0)	12	6 (4.7)	23	1.258 (0.590) [†]
Changes in urination	27 (17.4)	5 (19.2)	7	22 (17.1)	13	0.071 (0.780) [†]
Bathing/dressing	29 (18.7)	7 (26.9)	5	22 (17.1)	13	1.386 (0.271) [†]
Getting around	64 (41.3)	6 (23.1)	6	58 (45.0)	4	4.275 (0.039)

Table 3. Problem lists in the mild-distress and moderate-to-severe distress groups (n = 155). [†]Fisher's exact test.

Among the 36 questions on the PL, the problem items to which the patients answered “yes” to are ranked as follows: “pain” (60.6%), “sleep” (49.7%), “worry” (47.7%), “getting around” (41.3%), “indigestion” (39.4%), “eating” (36.8%), “diarrhea” (23.2%), and “fatigue” (22.6%). The distress scores were analyzed and categorized into the mild- and moderate-to-severe distress groups. In the moderate-to-severe distress group, the distress scores of “pain” (50.0%), “worry” (42.3%), “sleep disorder” (38.5%), “fears” (34.6%) were followed by those of “constipation” (26.9%) and “bathing/dressing” (26.9%). In the mild-distress group, the distress scores of “pain” (62.8%), “sleep” (51.9%), and “worry” (48.8%) were followed by those of “indigestion” (45.0%), “getting around” (45.0%), and “eating” (41.1%).

The PLs were divided into five areas and the rankings were evaluated. Among the 155 patients included in the study, “insurance/financial” (14.8%), “housing” (8.4%), and “work” (7.1%) were ranked highest in the practical domain area; “dealing with partner” (5.2%) in the family problems area; and by “worry” (47.7%), “fears” (38.7%),

and “loss of interest in usual activities” (20.6%) in the emotional problems area. Moreover, 2.6% of the patients responded that they had spiritual and religious problems.

In the moderate-to-severe distress group, “insurance/financial” (16.3%), “housing” (7.8%), and “work” (5.4%) were the problems faced in the practical domain area.

In the family problems area, “dealing with children” and “dealing with partner” were the same at (3.9%), and in the emotional problems area, “worry” (48.8%), “fears” (39.5%), and “sadness” (21.7%) were followed by “loss of interest in usual activities” (20.9%). In addition, 3.1% of patients responded that they had spiritual or religious concerns. In the physical problems area, “pain” (62.8%), “sleep” (51.9%), “indigestion” (45.0%), and “getting around” (45.0%), followed by “eating” (41.1%), “fatigue” (24.0%), and “diarrhea” (23.3%) were some of the problems faced by the patients (Table 3).

More patients in the moderate-to-severe distress group responded that they had emotional problems of “sadness” ($\chi^2 = 4.538$, $P < 0.05$) and physical problems of “indigestion” ($\chi^2 = 10.128$, $P < 0.001$), “eating” ($\chi^2 = 6.147$, $P < 0.013$), and “getting around” ($\chi^2 = 4.275$, $P < 0.039$) than in the mild-distress group.

Risk analysis of severe distress using demographic and clinicopathologic features

To identify the factors that affect the patients’ distress levels, “sex,” “occupational status,” “sadness,” “indigestion,” “eating,” and “getting around” were included in the PL. These factors were shown to be statistically significant in the univariate analysis (all $P < 0.05$) and were included in a binary logistic regression analysis.

Multivariate analysis of the risk of severe distress was performed for all patients. Occupational status (OR = 0.342, 95% CI = 0.133–0.879, $P = 0.026$) and indigestion (OR = 5.897, 95% CI = 1.647–21.111, $P = 0.006$) were independent risk factors for the presence of severe distress (Table 4).

Discussion

The DT is widely used to measure the distress index in patients with cancer. Many studies have reported the measurement or management of cancer-related distress in other cancers (breast cancer, lung cancer, cervical cancer, hematological malignancy, and colorectal cancer)^{17–25}. Distress management, such as pain control or emotional support, is important when patients with cancer receive palliative treatments. Moreover, the measurement and management of distress are important for patients with cancer who undergo surgery and adjuvant treatment.

The NCCN guidelines recommend interventions by mental health professionals when patients with cancer complain of moderate-to-severe distress^{26–28}. In this study, the average distress score of patients with pancreaticobiliary cancer was 6.21 ± 2.52 points, and 129 (83%) patients had moderate-to-severe distress with a score of ≥ 4 that required distress management. In particular, patients with pancreatic cancer have a high risk of developing distress in terms of psychosocial aspects, and several studies have reported that the level of distress in patients with pancreatic cancer is relatively high compared with that in other cancer types^{10,11}.

In a study²⁹ targeting patients who underwent surgery after first diagnosis of breast cancer, the average distress score of the patients was 5.0 ± 3.0 points, and in a study²³ conducted on patients with esophageal cancer, the average distress score was 4.06 ± 2.04 points. Compared to the results of these studies, the distress of patients with pancreaticobiliary cancer in the current study was fairly high.

In particular, the distress measurements in our study showed differences in scores of physical problems. In the moderate-to-severe distress group, a statistically significant difference in the scores of physical problems (indigestion, eating) were observed. Rates of discomfort due to physical problems, such as pain and sleep disorders, were higher in the moderate-to-severe distress group than in the mild-distress group. These results show the complexity of pancreaticoduodenectomy, which involves resecting multiple organs, creating multiple anastomosis sites, and can result in postoperative digestive function changes and frequent complications related to eating disorders, such as delayed gastric emptying. Furthermore, in the emotional domain, “sadness” was higher in the moderate-to-severe distress group than in the mild-distress group. Similarly, in Burrell’s study, of the emotional symptom cluster of symptoms reported by patients who underwent pancreatectomy, 22% reported a history of a mental health disorder, with the majority experiencing a mood disorder, including depression in 61% and anxiety in 45%. It was reported that it did. This suggests that it is important to evaluate not only physical problems but also psychological problems in patients with pancreatic cancer³⁰. In particular, patients with pancreatic cancer experience psychological distress due to physical symptoms, such as pain, digestive problems, cachexia, and fatigue. However, in clinical settings, medical staff are often unable to identify patients’ distress in a timely manner, and fail to implement appropriate evaluations and interventions for psychological problems.

Variables	Univariable model		Multivariable model (Stepwise)	
	OR (95% CI)	P	OR (95% CI)	P
Sex (ref: male)	0.324 (0.122–0.860)	0.024	–	
Occupational status (ref:no)	0.291 (0.118–0.718)	0.007	0.342 (0.133–0.879)	0.026
Sadness (ref:no)	6.931 (0.899–53.416)	0.063		
Indigestion (ref:no)	6.263 (1.791–21.906)	0.004	5.897 (1.647–21.111)	0.006
Eating (ref:no)	3.836 (1.249–11.774)	0.019	–	
Getting around (ref:no)	2.723 (1.026–7.227)	0.044	–	

Table 4. Factors influencing moderate-to-severe distress. CI, confidence interval; OR, odds ratio; ref, reference.

In our study, occupation status was found to be an important factor in the moderate-to-severe distress group. It is thought that these results were obtained because being able to keep a job means that there is a high possibility of maintaining quality of life. These patients are typically physically, economically, and mentally healthier than those without a job. Interestingly, in a study conducted on gastrointestinal cancers (liver cancer, pancreatic cancer, biliary tract cancer, colon cancer, stomach cancer, and esophageal cancer), many patients wanted to work even after a cancer diagnosis³¹. Also, according to previous studies, necessary rehabilitation treatment was continuously provided to patients after cancer treatment. It was said that continuity of treatment is related to cancer patients' return to work³². In order for patients to return to work after treatment, it is necessary to develop processes and interventions that support patients to return to work from the hospital environment early in the treatment process.

There were no significant differences in postoperative complications between the two groups. Therefore, even in the absence of severe pancreatectomy complications, such as pancreatic fistula and delayed gastric emptying after surgery, surgical stress has a significant effect on patients' distress scores. To the best of our knowledge, cancer-related distress is known to affect recurrence. Therefore, cancer-related distress not only affects the quality of life but also the survival rate^{33–35}.

In our study, the patients who received neoadjuvant treatment showed differences in distress scores. Patients who received neoadjuvant treatment had lower DT scores than those who underwent upfront surgery. This is important because the prevalence of neoadjuvant treatments for pancreaticobiliary cancer is increasing. However, there have been no studies on the distress experienced by patients with pancreaticobiliary cancer who undergo neoadjuvant treatment compared to that experienced by patients who undergo upfront surgery. We assumed that patients who received neoadjuvant therapy had lower distress scores than those who received upfront surgery because they had overcome the emotional stress of cancer diagnosis much earlier.

This study had some limitations. We were unable to evaluate the preoperative distress scores of the patients. However, considering the great impact of surgery for pancreaticobiliary cancer, the postoperative score was sufficient to allow patients to assess their distress levels and consider distress management. As the number of patients receiving neoadjuvant chemotherapy was small, it is necessary to conduct more prospective studies.

In conclusion, our results highlight that patients with pancreaticobiliary cancer often exhibit higher distress levels than those who undergo surgery for other cancers; therefore, the approach used in this study holds significance. These results can serve as basic data for identifying individuals with higher distress levels and for implementing psychosocial interventions. Future studies should actively monitor distress indices in patients with pancreaticobiliary cancer and strive to improve their quality of life.

Data availability

All data generated or analyzed during this study are included in this published article.

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Author contributions

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by [So Young Jun], [Hyung Sun Kim]. The first draft of the manuscript was written by [So Young Jun] and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Competing interests

The authors declare no competing interests.

Additional information

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