

Prognosis for Periapillary Cancers after Pancreaticoduodenectomy

Kyung Beom Lee, M.D., Byung Wook Min, M.D., Tae Jin Song, M.D., Sung Ok Suh, M.D., Young Chul Kim, M.D. and Sang Yong Choi, M.D.

Purpose: The survival after a pancreaticoduodenectomy, for a periampullary adenocarcinoma is limited. However, the improvement in perioperative management, and the development of interventional medicine have made the survival from that cancer favorable. Due to the anatomical proximity of periampullary tumors, surgeons perform same procedure. It is accepted that the outcome of periampullary cancers vary after resection. The purpose of this study was to evaluate the risk factors, and the differences in survival, from periampullary cancers according to the origin of the tumor. **Methods:** From March 1992 to December 2000, 87 patients, with periampullary tumors, who underwent a pancreaticoduodenectomy, were analyzed for the location of the tumor and the tumor status. Of the 87 patients, the 85 surviving more than 30 days were included in the statistic analysis. The survival was calculated using the Kaplan-Meier Method. The risk factors were also analyzed between the locations. **Result:** Of the 87 resected adenocarcinomas, 25 were pancreatic cancers, 30 distal CBD (common bile duct) cancers, 26 ampulla of Vater cancers and 6 duodenal cancers. The patients had a mean age of 60 (40-78) years. The total bilirubin, ALT, and CA 19-9 levels were statistically different for each cancer. There were no statistical differences between the cancer groups in operative methods, the amount of transfusion, postoperative hospital stay, and complications. The overall morbidity and mortality were 37 and 2%, respectively. The 5-year survival rates for the pancreatic, distal CBD, and Ampulla of Vater cancers were 9.6, 45.5, and 72.1%, respectively, was and were

statistically significant ($P < 0.001$). A univariate analysis of the 85 patients indicated that the predictors of long term survival included: a pathologic diagnosis of Ampulla of Vater cancer, absence of lymph node metastasis, tumor diameter < 3 cm and complication.

Conclusion: The factors influencing the survival were nodal metastasis, size of the tumor, age, and complications. The differences in the tumor biology will affect the survival, and although a pancreaticoduodenectomy remains the procedure of choice for periampullary tumors, adjuvant, or neoadjuvant, therapy for a pancreatic head tumor is especially needed. (J Korean Surg Soc 2003;64:236-242)

Key Words: Periapillary adenocarcinoma, Pancreaticoduodenectomy, Survival

Department of Surgery, School of Medicine, Korea University, Seoul, Korea

가 . 가
가 , 가
가 . 가
가 .(1,3,10)
가 .
가 .(1-7)

가 가
가 , 가
48 , 9.5
ASA I II
Total Bilirubin 72% 가
10 mg/dl 가 40%
Total Bilirubin 10.11 mg/dl,
11.91 mg/dl, 8.32 mg/dl,
0.58 mg/dl 가
(P=0.022). ALT
가 , 가
CA19-9 2181 U/ml
27 U/ml (P=0.045). Ca19-9
48 , 37
34 , 13
10 (77%)
14 11
PT
(prothrombin time) , ,
가 (Table 1).
1 cm , 1 cm 80 ,
1 가
가 ,
(P=0.003).
(P=0.003). 1 cm
trostomy, octreotide , vagotomy tube gas-
가 . 가 4
(Poor) 4 , (Moderate) 가 45 ,
(Well) 가 36 .
30
85 . 1.8 (unit) 가
가 . ,
가 (Table 2).
33 (37%)
가 3 2
1 2
1
2% (1/88) , 77
87 1.3 1 11
가 5 , 39
60 가 18 . 5
60.1 가 , 56.4 3 가 .



1 , 가 (Table 3).
 2 . 10 57 1 85
 24.6 가 , .

Table 1. Patients characteristics

	Pancrease (n=25)	CBD (n=30)	AoV (n=26)	Duodenum (n=6)	P-value
Age (years : mean)	60.1	61.9	56.4	64.3	0.098
Sex (male : female)	1.08 : 1	1.72 : 1	0.86 : 1	5 : 1	0.309
ASA classification					0.591
I~II	21	24	23	6	
III~IV	4	6	3	0	
Preoperative lab.					
Total bilirubin (mg/dl)	10.1	12.0	8.3	0.6	0.022
Albumin (g/dl)	3.6	3.7	3.4	3.9	0.239
ALT (IU/L)	95.3	130.9	71.6	50.2	0.027
Amylase (u/dl)	93.4	106.0	130.5	86.1	0.718
PT (INR)	0.98	0.96	0.93	0.99	0.120
WBC (/ul)	8522	7665	6853	5683	0.164
Hb (g/dl)	12.2	12.3	11.9	11.3	0.664
Preop. biliary drainage					0.055
Yes	11	21	15	1	
No	14	9	11	5	

CBD = common bile duct; AoV = ampullar of Vater; ASA = American Society of Anesthesiologists.

Table 2. Intraoperative findings

	Pancrease (n=25)	CBD (n=30)	AoV (n=26)	Duodenum (n=6)	P-value
Operations					0.769
PPPD	22	28	24	6	
Classic Whipple's op.	3	2	2		
Anastomosis					0.573
Duct to mucosa	19	24	23	5	
Dunking	6	6	2	1	
Gastro-pancreatic	0	0	1	0	
Tumor size (cm)	3.21	1.76	2.59	3.25	0.003
Lymph node mets					0.003
Positive	14	5	8	5	
Negative	11	23	18	1	
Resection margin					0.112
involved	4	0	1	1	
1 cm 미만	0	2	0	0	
1 cm 이상	21	28	25	5	
Transfusion (pint)	1.8	1.16	1.42	1.50	0.463
OP. duration	408.4	386.5	392.7	403.3	0.656
Oral intake	9.1	12.9	11.3	8.8	0.132

CBD = common bile duct; AoV = ampullar of Vater; PPPD = pylorus preserving pancreaticoduodenectomy.

Table 3. Complications and postoperative results

Complications	Pancrease (n=25)	CBD (n=30)	AoV (n=26)	Duodenum (n=6)	P-value
DGE	0	2	2	0	0.514
P-J leakage	0	3	4	0	0.195
C-J leakage	0	1	0	0	0.601
Intrabd. abscess	0	3	1	0	0.327
Bleeding	1	1	2	0	0.498
Wound abscess	3	3	4	1	0.930
Pneumonia	0	0	1	0	0.511
ARF	1	1	0	0	0.758
Reoperation	1	1	3	0	0.498
Mortality	0	2	0	0	0.282
Postop. hosp. stay	21.7	24.6	22.6	21.8	0.804

CBD = common bile duct; AoV = ampullar of Vater; DGE = delayed gastric emptying; P-J = pancreatico-jejunostomy; C-J = choledocho-jejunostomy; ARF = acute renal failure.

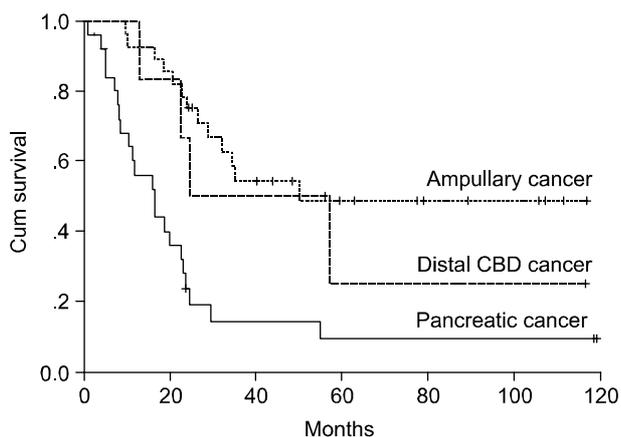


Fig. 1. Cumulative survival curves for patients with pancreatic cancer, bile duct cancer, or ampullary cancer (P<0.001).

가
35.27
가
가 1 cm
18.77
가 1 cm
(Table
4).
P 0.05
가
P 0.25
가 70
가 70
74%가
(Table 5).
5 22 (26%) 2
8 , 11 , 1 . 21
(24%)
2 cm
5 9.6%,
45.5%, 72.1%,
23%
(P<0.001, Fig. 1).
가 가
(2,10)
37%, 2%
5 41%
16.37 , 5 9.6%

Table 4. Univariate analysis of risk factors for patients' survival

	Median survival (months)	P-value
Age		0.132
< 70	32.33	
≥70	54.93	
Sex		0.073
Male	28.90	
Female	35.55	
Operative method		0.625
PPPD	36.10	
Classic	35.27	
Transfusion		0.752
Yes	50.50	
No	24.07	
LN status		0.005
Negative	35.27	
Positive	18.77	
Tumor size		0.026
< 3 cm	77.73	
≥3 cm	22.57	
Differentiation		-
Well	22.25	
Moderate	24.73	0.976
Poorly	5.33	0.172
Resection margin		-
Involved	23.60	
< 1 cm	34.40	0.398
≥1 cm	50.50	0.204
Origin of tumor		-
Pancrease	16.37	
Ampullar	54.50	< 0.001
CBD	50.50	< 0.001
Duodenum	24.73	0.072
Underlying disease		0.226
Yes	29.43	
No	77.73	
Complication		0.022
Yes	44.03	
No	28.90	
Reoperation		0.521
Yes	36.63	
No	34.43	

Table 5. Multivariate analysis for the risk factors

	Odds ratio	95% confidence interval	P-value
Age			
< 70	1.0	-	-
≥70	0.26	0.09~0.76	0.014
Origin of tumor			
Pancreatic cancer	1.0	-	-
Ampullar	0.13	0.06~0.31	< 0.001
Common bile duct	0.19	0.09~0.40	< 0.001
Duodenum	0.31	0.11~0.94	< 0.001
LN status			
Negative	1.0	-	-
Positive	2.23	1.25~3.97	0.007

가 (14)

. 1935 Whipple (18)
(main duct)

Catell (20)
, Satoru (16)

가 (12,14,16)

7

. 1946 Whipple (21)

가 (14,16)

6

가

(Table 3).

가 (6-8,10)

가 (Table 5).

5

가 25 4 (16%), 1 cm 가

가 4 (16%) 가

(1,3-6,12,25)

(1-6,12)가

14 (56%) 가

가

가

가 (1,3,6,7)

가

가 (17,22-25)

TNM 가

AJCC (1997) T1

T2 2 cm 3 cm

가 2 cm 3 cm

가 (Table 4).

가

가 3 cm

가

가 3 cm

가

Ishikawa (26)

5 5 28%

가

가 (11,15,19,27)

가

가

가

1 cm 1 cm 1 cm

가 1 cm

가가

가 (6-8) 70

가

가

가 (9)

가 (24,28)가

가

가

가

가

5-FU

가 (17-27)

5 22

24%



가

가

가

가

가

가

REFERENCES

- 1) Kim SW, Park SJ, Jang JY, Park YC, Lee KU, Choe KJ, et al. Forty-year experience with the pancreatoduodenectomy. J Korean Surg Soc 2000;59:643-50.
- 2) Moon HJ, Sohn TS, Noh JH, Choi SH, Joh JW, Kim YI. Postoperative complications following 122 pancreatoduodenectomies. J Korean Surg Soc 1999;56:256-66.
- 3) Song JB, Choi KH, Lee SD. Peripullary carcinoma: A study on prognostic factors influencing long term survival after pancreatoduodenectomy. J Korean Surg Soc 1998;55:833-42.
- 4) Bae JS, Kang KJ, Song WH, Lim TJ, Kim H. Survival analysis according to the treatment modalities of the peripullary carcinoma. Korean J Gastroenterol 1999;34:674-81.
- 5) Janes RH Jr, Niederhuber JE, Chmiel JS, Winchester DP, Ocwieja KC, Karnell JH, et al. National patterns of care for pancreatic cancer. Results of a survey by the commission on cancer. Ann Surg 1996;223:261-72.
- 6) Kevin CC, David SK, Murray FB. Long-term survival after curative resection for pancreatic ductal adenocarcinoma. Ann Surg 1996;223:273-9.
- 7) Charles JY, Taylor AS, John LC, Ralph HH, Keith DL, Henry AP. Peripullary adenocarcinoma, analysis of 5-year survivors. Ann Surg 1998;227:821-31.

- 8) John P. Neoptolemos, et al. Influence of resection margins on survival for patients with pancreatic cancer treated by adjuvant chemoradiation and/or chemotherapy in the ESPAC-1 randomized controlled trial. *Annals of Surgery* 2001;234:758-68.
- 9) Burcharth F, Olsen SD, Trillingsgaard J, Federspiel B, Moesgaard F, Struckmann JR. Pancreaticoduodenectomy for periampullary cancer in patients more than 70 years of age. *Hepatology* 2001;48:1149-52.
- 10) Sarmiento JM, Nagomey DM, Sarr MG, Farnell MB. Periampullary cancers: are there differences? *Surg Clin North Am* 2001;81:543-55.
- 11) Fortner JG. Regional pancreatectomy for cancer of the pancreas, ampulla, and other related sites. Tumor staging and results. *Ann Surg* 1984;199:418-25.
- 12) Lerut JP, Gianello PR, Otte JB, Kestens PJ. Pancreaticoduodenal resection. Surgical experience and evaluation of risk factors in 103 patients. *Ann Surg* 1984;199:432-7.
- 13) Yeo CJ, Cameron JL, Sohn TA, Lillemoe KD, Pitt HA, Talamini MA, et al. Six hundred fifty consecutive pancreaticoduodenectomies in the 1990s: pathology, complications, and outcomes. *Ann Surg* 1997;226:248-57; discussion 257-60.
- 14) Kakita A, Yoshida M, Takahashi T. History of pancreaticojejunostomy in pancreaticoduodenectomy: development of a more reliable anastomosis technique. *J Hepatobiliary Pancreat Surg* 2001;8:230-7.
- 15) Henne-Bruns D, Vogel I, Luttgies J, Kloppel G, Kremer B. Surgery for ductal adenocarcinoma of the pancreatic head: staging, complications, and survival after regional versus extended lymphadenectomy. *World J Surg* 2000;24:595-601; discussion 601-2.
- 16) Matsusue S, Takeda H, Nakamura Y, Nishimura S, Koizumi S. A prospective analysis of the factors influencing pancreaticojejunostomy performed using a single method, in 100 consecutive pancreaticoduodenectomies. *Surg Today* 1998;28:719-26.
- 17) Yeo CJ, Cameron JL. Improving results of pancreaticoduodenectomy for pancreatic cancer. *World J Surg* 1999;23:907-12.
- 18) Whipple AO, Parsons WB, Mullins CR. Treatment of carcinoma of the ampulla of Vater. *Ann Surg* 1902;76:763-79.
- 19) Geer RJ, Brennan MF. Prognostic indicators for survival after resection of pancreatic adenocarcinoma. *Am J Surg* 1993;165:68-72; discussion 72-3.
- 20) Catell RB. Resection of the pancreas, discussion of special problems. *Surg Clin North Am* 23:753-766.
- 21) Whipple AO. Observations on radical surgery for lesions of the pancreas. *Surg Gynecol Obstet* 82:623-31.
- 22) Trede M, Schwall G, Saeger HD. Survival after pancreaticoduodenectomy. 118 consecutive resections without an operative mortality. *Ann Surg* 1990;211:447-58.
- 23) Crist DW, Sitzmann JV, Cameron JL. Improved hospital morbidity, mortality, and survival after the Whipple procedure. *Ann Surg* 1987;206(3):358-65.
- 24) Cameron JL, Crist DW, Sitzmann JV, Hruban RH, Boitnott JK, Seidler AJ, et al. Factors influencing survival after pancreaticoduodenectomy for pancreatic cancer. *Am J Surg* 1991;161:120-4.
- 25) Yeo CJ, Cameron JL, Lillemoe KD, Sitzmann JV, Hruban RH, Goodman SN, et al. Pancreaticoduodenectomy for cancer of the head of the pancreas. 201 patients. *Ann Surg* 1995;221:721-31.
- 26) Ishikawa O, Ohhigashi H, Sasaki Y, Kabuto T, Fukuda I, Furukawa H, et al. Practical usefulness of lymphatic and connective tissue clearance for the carcinoma of the pancreas head. *Ann Surg* 1988;208:215-20.
- 27) Harrison LE, Klimstra DS, Brennan MF. Isolated portal vein involvement in pancreatic adenocarcinoma. A contraindication for resection? *Ann Surg* 1996;224:342-7; discussion 347-9.
- 28) Park SJ, Kim SW, Jang JY, Lee KU, Park YH. Intraoperative transfusion: is it a real prognostic factor of periampullary cancer following pancreaticoduodenectomy? *World J Surg* 2002;26:487-92.