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Total Parenteral Nutrition in Patients Following Pancreaticoduodenectomy: Lessons from 1184 Patients

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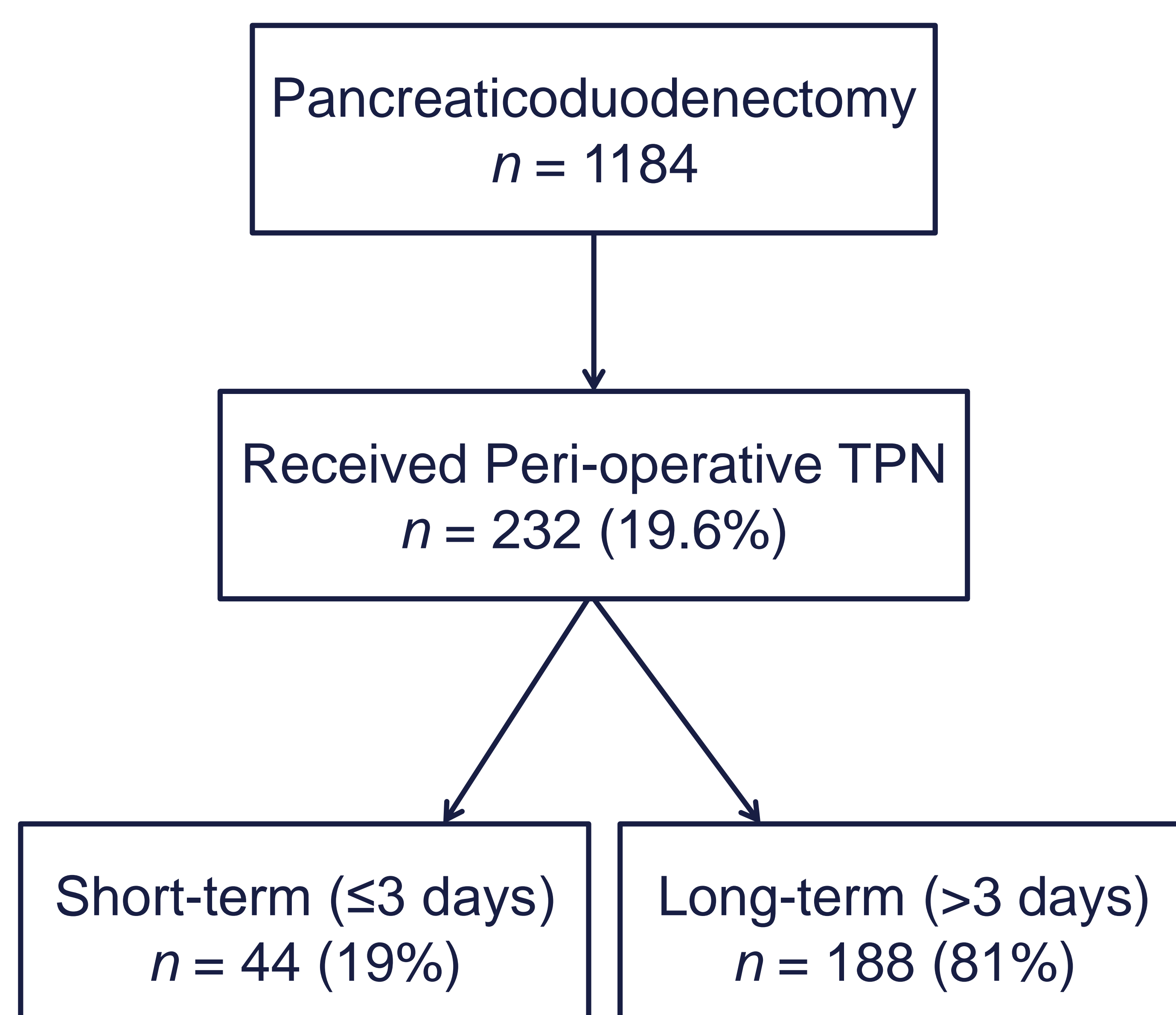
BACKGROUND

- Total parenteral nutrition (TPN) has historically been used conservatively in the management of patients after pancreaticoduodenectomy (PD).
- In this study, we evaluate the indications for and outcomes associated with TPN use in a high-volume pancreatic surgery center.

METHODS

- Following IRB approval, all cases of PD from December 2006 through December 2015 were reviewed utilizing our pancreatic surgery database.
- Following identification of peri-operative TPN use, patients were separated into two cohorts with the hypothesis that was those patients who were started on TPN but received it for less than 3 days due to an improvement in their clinical condition, most likely were overprescribed.

Figure 1. Study Design



RESULTS

Table 1. Patient Demographics and Operative Data

	No TPN n=952 (80%)	TPN n=232 (20%)	p-value
Male	453 (48)	156 (67)	0.0001
Age	66.8 (18-92)	69.3 (37-90)	0.007
BMI	25.6 (10.8-52.6)	26 (15-43.9)	0.30
Diabetic	245 (26)	60 (26)	1.00
Smoker (Current or Past)	448 (47)	131 (56)	0.01
Pylorus Preservation	801 (84)	183 (79)	0.06
EBL (mL)	430 (50-1600)	630 (40-8000)	0.08
Soft Gland (n=872;n=204)	421 (48)	114 (56)	0.05
Pathology			
PDA	601 (63)	164 (71)	0.03
IPMN	138 (15)	27 (12)	0.29
Pancreatitis	52 (5)	6 (3)	0.09

Table 2. Indications for and Patterns of TPN Use

Complication	TPN ≤3 Days n=44 (19%)	TPN >3 Days n=188 (81%)	p-value
Any Complication	39 (89)	179 (95)	0.15
DGE	32 (73)	139 (74)	0.85
Grade A	25 (78)	59 (42)	0.0003
Grade B	6 (19)	53 (38)	0.04
Grade C	1 (3)	27 (19)	0.03
Pancreatic Fistula	8 (18)	94 (50)	0.0001
Grade A	5 (63)	24 (26)	0.04
Grade B	2 (25)	57 (61)	0.07
Grade C	1 (13)	13 (14)	1.00
Deep Surgical Site Infection	7 (16)	91 (48)	0.0001
Pneumoniae	0 (0)	31 (16)	0.001

Table 3. Postoperative Imaging

Patient Imaging	TPN ≤3 Days n=44 (%)	TPN >3 Days n=188 (%)	p-value
Upper GI Imaging	20 (46)	109 (58)	0.18
Normal function	5 (25)	35 (32)	0.61
Aperistalsis	6 (30)	40 (37)	0.62
Anastomotic edema	8 (40)	18 (17)	0.03
CT Imaging	22 (50)	157 (84)	0.0001
Fluid collection	17 (77)	126 (80)	0.78
Drainable collections	5 (23)	94 (60)	0.001

Table 4. Post TPN Outcomes

Postoperative Measure	TPN ≤3 Days n=44 (%)	TPN >3 Days n=188 (%)	p-value
CLABSI	0 (0)	6 (3)	0.60
Total Days on TPN	2 (1-3)	12 (4-115)	0.0001
LOS (days)	8.5 (6-16)	14 (3-92)	0.0005
Readmission	16 (36)	66 (35)	0.86
30-Day Mortality	3 (7)	5 (3)	0.18

RESULTS

Table 5. Multivariate Logistic Regression Analysis of Factors Affecting Length of TPN Use

Risk Factor	Odds Ratio	95% CI	p-value
Diabetes	0.49	0.24-1.03	0.060
DGE	1.22	0.57-2.60	0.105
Pancreatic Fistula	2.57	1.03-6.41	0.043
Deep Surgical Site Infection	3.09	1.16-5.06	0.018

KEY FINDINGS

- The most common indications for TPN were delayed gastric emptying (DGE, n=171, 73.7%), pancreatic fistula (PF, n=102, 44%), and generalized malnutrition (n=25, 10.8%).
- The median day of TPN initiation was POD 4 (range: minus 31 to 22), with a median usage of nine days (range: 1 to 115).
- Forty-four (19%) patients received short-course TPN (≤3 days), primarily those diagnosed with isolated Grade A DGE without associated complications (p=0.0003).
- Multivariate analysis suggests the presence of deep surgical site infection (OR 3.09, [1.16 - 5.06], p=0.018) or PF (OR 2.57, [1.03 - 6.41], p=0.043) at the time of DGE presentation as predictive of long-term TPN requirement.

CONCLUSIONS

- TPN is safe and effective in patients following PD.
- Avoid TPN in patients with isolated DGE secondary to anastomotic edema.
- Use TPN in patients with DGE and another serious complication such as deep surgical site infection or PF.