



EFFECT OF PREOPERATIVE NUTRITIONAL STATUS ON EARLY POST OPERATIVE OUTCOME IN PATIENTS UNDERGOING PANCREATICOUDUODENECTOMY

Medicine

Varun Dasari MBBS, MS, M. Ch. Sri venkateswara institute of medical sciences, Tirupati

Chandrakasan Chandramaliteeswaran* MBBS, MS, DNB, Sri venkateswara institute of medical sciences, Tirupati
*Corresponding Author

Vutukuru Venkatarami Reddy MBBS, MS, DNB, Sri venkateswara institute of medical sciences, Tirupati

Lokesh Arora MBBS, DNB, Sri venkateswara institute of medical sciences, Tirupati

ABSTRACT

INTRODUCTION: Malnutrition has been determined to be an independent risk factor for morbidity and mortality in patients undergoing surgical procedures. A prospective study was undertaken to estimate the prevalence of malnutrition in patients and to evaluate the effect of preoperative malnutrition on the early postoperative outcome in patients undergoing pancreaticoduodenectomy.

METHODS: 49 patients underwent pancreaticoduodenectomy were included in the study. Preoperative nutritional status was evaluated by serum albumin, BMI, Malnutrition Universal Screening Tool (MUST), Triceps skinfold thickness (TSFT), Subjective Global Assessment (SGA). Effect of malnutrition on morbidity, mortality and length of hospital stay was assessed.

RESULTS: Prevalence of malnutrition was high (BMI: 42.85%, TSFT: 61.22%, Serum albumin: 48.98%, MUST: 78.54%, SGA: 51%). The overall incidence of postoperative pancreatic fistula (POPF) and delayed gastric emptying (DGE) were 59.2% and 55.1% respectively. Patients categorized as malnourished by SGA had significantly higher risk of POPF (80% vs. 33%; $p = 0.001$) and mortality (5% vs. 0%; $p < 0.001$). Serum albumin, MUST and TSFT were not predictive of early post operative outcomes.

CONCLUSION: The prevalence of malnutrition in patients undergoing pancreaticoduodenectomy is high. SGA is a reliable parameter in predicting postoperative morbidity and mortality.

KEYWORDS

Malnutrition, pancreaticoduodenectomy, serum albumin, BMI, Malnutrition Universal Screening Tool (MUST), Triceps skinfold thickness (TSFT), Subjective Global Assessment (SGA)

INTRODUCTION

Pancreatic cancer has been shown to be associated with malnutrition, which can be caused by tumor progression, concomitant pancreatitis, decreased oral intake. Malnutrition, a medical condition caused by improper or insufficient diet, has been determined to be an independent risk factor for morbidity and mortality in patients undergoing surgical procedures.

There are relatively few studies documenting the effect of preoperative malnutrition on morbidity following pancreaticoduodenectomy. In a series of 132 patients undergoing pancreatic surgery, Sierzega *et al.* demonstrated an association between malnutrition and pancreatic fistula¹. Schnellendorfer *et al.* found that patients with a low serum albumin undergoing surgery for chronic pancreatitis were at greater risk of developing a pancreatic fistula ($P=0.04$)².

A prospective study was undertaken to estimate the prevalence of malnutrition in patients and to evaluate the effect of preoperative malnutrition on the early postoperative outcome in patients undergoing pancreaticoduodenectomy.

MATERIALS AND METHODS

Patients undergoing pancreaticoduodenectomy from May 2015 to November 2016 were included in the study. Preoperative nutritional status was evaluated by serum albumin, BMI, Malnutrition Universal Screening Tool (MUST), Triceps skinfold thickness (TSFT), Subjective Global Assessment (SGA). Effect of malnutrition on morbidity, mortality and length of hospital stay was assessed.

The MUST is an easy and rapid malnutrition-screening tool, validated by several studies, that combines BMI, percentage of unexplained weight loss, and the presence of an acute disease. It is a five-step screening tool to identify patients who are malnourished and at risk of malnutrition.³

Subjective Global Assessment⁴:

SGA grade is determined on the basis of interview information about weight loss; change in dietary intake, digestive organ symptoms, physical function, and underlying disease as well as on physical

examination findings such as subcutaneous fat, quantity of skeletal muscle, presence of edema, and ascites. The clinician then subjectively designates the overall nutritional status of the patient into one of 3 categories: "well nourished"; (grade A), "mild-moderate malnutrition"; (grade B), or "severe malnutrition"; (grade C). From a medical economics view point, SGA is a low cost tool which does not require any laboratory test or medical imaging. Reliable grading depends on collection of correct history and observation.

The effect of nutritional status as defined by the aforementioned parameters was studied including Pancreatic fistula, Delayed gastric emptying, Post pancreatotomy Hemorrhage, wound complications and 30 day mortality is taken into account Data analyzed using appropriate statistical measures. p value < 0.05 was considered significant

RESULTS:

A total of 49 patients underwent pancreaticoduodenectomy during the study period. Out of them 23 were male patients, 26 were female. 45 patients were operated for malignancy, 4 patients were operated for benign causes. Of the patients who were operated for malignancy, 28 patients had ampullary adenocarcinoma, 8 patients had carcinoma head of pancreas, 2 patients had distal cholangiocarcinoma and 7 patients had duodenal adenocarcinoma. In the benign group, 2 patients had cystic neoplasms of pancreas and 2 patients had chronic calcific pancreatitis. Thirteen patients had diabetes, hypertension was seen in 11 patients. 2 patients had cardiac comorbidities, cirrhosis was seen in one patient. 8 of the 49 patients were smokers, 7 were habituated to alcohol.

Prevalence of malnutrition was high, which varied based on the assessment tool applied.

Assessment tool	Prevalence
BMI	42.85%
TSFT	61.22%
Serum albumin	48.98%
MUST	78.54%
SGA	51.00%

Post operative pancreatic fistula was seen in 29 patients (59.18%), Clinically relevant pancreatic fistula (Grades B and C) was seen in a total of 10 patients (20.49%). Delayed gastric emptying was seen in 27 patients (55.10%). All were Grade A according to the ISGPS classification of DGE.

Complications	No. of patients
Post pancreatectomy hemorrhage	1, (2.04%)
Surgical site infections	15, (30.61%)
Cardiac complications	2, (4.08%)
Chest infection	4, (8.16%)
Acute kidney injury	1, (2.04%)

Overall incidence of mortality was 4/49 (8.14%), Aspiration pneumonia in two patient, Myocardial infarction in one patient, and Pulmonary thromboembolism in one patient. Mean hospital stay in the study was 9.8 days.

According to BMI, 21 patients (42.85%) were underweight (BMI < 18.5). 26 patients (53.06) had adequate BMI (18.5 to 24.9), 2 patients (4.08%) were overweight. All the post operative complications and hospital stay were comparable in underweight and well nourished patients except DGE, which is more common in well nourished patients with significant p value of 0.0476.

	BMI < 18.5 (n = 21) (% with specified complication)	BMI ≥ 18.5 (n = 26) (% with specified complication)	P value
POPF	47.61	67.85	0.2402
CR POPF	19.04	27.27	1.000
DGE	38.09	67.85	0.0476
PPH	5	0	0.4286
Death	14.28	3.57	0.3006
SSI	19.04	39.28	0.2103
Hospital Stay	11.82 ± 4.07	10.43 ± 3.44	0.2126

Thirty patients (61.22%) had a triceps skinfold thickness below the 5th percentile of the reference values and hence were considered malnourished. All the post operative complications and hospital stay were comparable in malnourished and well nourished patients except DGE, which is more common in well nourished patients with significant p value of 0.0453.

Twenty five patients (51.02%) had an albumin level of >3.5g/dL and 24 (48.98%) had an albumin level in the range of 2.6 to 3.5g/dL. All the post operative complications and hospital stay were comparable in malnourished and well nourished patients.

As per calculation by MUST, 11 (22.44%) were at low risk of malnutrition, 12 (24.48%) were at medium risk and 26 (53.06%) were at high risk of malnutrition. All the post operative complications and hospital stay were comparable in patients of low, medium and high risk of malnutrition.

When assessed by SGA, 24 (48.98%) were well nourished i.e. grade A, 20 (40.82%) had mild to moderate (grade B), and 5 (10.20%) had severe malnutrition (grade C). Clinically relevant POPF was seen in 3 patients (12.5%) in the grade A group, 4 patients (20%) in the grade B group, and 3 patients (60%) in the grade C group. This difference was not significant statistically. (p=0.056).

A soft pancreas is well known independent risk factors for POPF after pancreaticoduodenectomy. In our study 11 out of 15 patients with soft pancreas developed POPF, out of which 7 were clinically relevant. A Total of 15 patients were having soft pancreas in study group out of 49 patients. In our study group soft pancreas was evenly distributed between malnourished and well nourished groups.

DISCUSSION

Malnutrition was seen in a high percentage of the patients undergoing pancreaticoduodenectomy in the present study. It ranged from 42.85% as estimated by BMI to 77.54% as estimated by MUST. In the study by La Torre et al⁵, the prevalence of malnutrition ranged from 36% as measured by serum albumin to 83%, as measured by MUST.

	BMI	TSFT	Albumin	MUST	SGA
La Torre et al ⁵	52%	-	36%	89%	52%
Winter et al ⁶	-	-	26%	-	-
Kanda et al ⁷	20.52%	-	44.4%	-	-
Present study	42.85%	61.22%	48.98%	77.54%	51.02

Lower incidence of DGE in patients who are considered malnourished when assessed by BMI and TSFT is an interesting finding. Although pancreatic cancer patients have been shown to have lower levels of plasma ghrelin⁸, the difference in ghrelin levels between malnourished patients and well nourished patients with pancreatic cancer has not been studied. Ghrelin has been shown to have a negative correlation with nutritional status in other studies⁹ and it is a known stimulator of gastric motility¹⁰. The lower incidence of DGE in the malnourished group can be explained if it can be proved that ghrelin levels are higher in these patients compared to those of well nourished patients. This requires assessment of ghrelin levels in both groups of patients and comparing them.

CONCLUSION

Subjective Global Assessment is a reliable parameter in predicting postoperative pancreatic fistula and mortality. Objective parameters of nutritional status like Body Mass Index, Triceps Skinfold Thickness, Serum Albumin and Malnutrition Universal Screening Tool are not reliable in predicting post operative outcomes Delayed gastric emptying is seen less frequently in patients who are malnourished as defined by Body Mass Index and Triceps Skinfold Thickness.

REFERENCES

- Sierzega, M., Niekowal, B., Kulig, J., Popiela, T. Nutritional status affects the rate of pancreatic fistula after distal pancreatectomy: a multivariate analysis of 132 patients. *J Am Coll Surg* 2007;205(1):52-9.
- Schnelldorfer, T., Mauldin, P.D., Lewin, D.N., Adams, D.B. Distal pancreatectomy for chronic pancreatitis: risk factors for postoperative pancreatic fistula. *J Gastrointest Surg Off J Soc Surg Aliment Tract* 2007;11(8):991-7.
- Todorovic, V., Russell, C., Elia, M. THE 'MUST' EXPLANATORY BOOKLET. Worcs B98 7LG: The British Association for Parenteral and Enteral Nutrition (BAPEN); 2011. www.bapen.org.uk. (accessed).
- Detsky, A.S., McLaughlin, J.R., Baker, J.P., Johnston, N., Whittaker, S., Mendelson, R.A., et al. What is subjective global assessment of nutritional status? *J Parenter Enteral Nutr*. 1987;11(1):8-13.
- La Torre, M., Ziparo, V., Nigri, G., Cavallini, M., Balducci, G., Ramacciato, G. Malnutrition and pancreatic surgery: prevalence and outcomes. *J Surg Oncol* 2013;107(7):702-8.
- Winter, J.M., Cameron, J.L., Yeo, C.J., Alao, B., Lillemoe, K.D., Campbell, K.A., et al. Biochemical markers predict morbidity and mortality after pancreaticoduodenectomy. *J Am Coll Surg*. 2007;204(5):1029-1036-38.
- Kanda, M., Fujii, T., Kodera, Y., Nagai, S., Takeda, S., Nakao, A. Nutritional predictors of postoperative outcome in pancreatic cancer. *Br J Surg*. 2011;98(2):268-74.
- Legakis, I., Stathopoulos, J., Moutzouridis, T., Stathopoulos, G.P. Decreased plasma ghrelin levels in patients with advanced cancer and weight loss in comparison to healthy individuals. *Anticancer Res*. 2009;29(10):3949-52.
- Vanitha, R.N., Kavimani, S., Soundararajan, P., Chamundeeswari, D., Kannan, G., Rengarajan, S. Ghrelin and its Association with Nutritional and Inflammatory Status of Patients on Maintenance Hemodialysis in a South Indian Tertiary Care Hospital. *Ann Med Health Sci Res*. 2016;6(3):146-55.
- Levin, F., Edholm, T., Schmidt, P.T., Grybäck, P., Jacobsson, H., Degerblad, M., et al. Ghrelin stimulates gastric emptying and hunger in normal-weight humans. *J Clin Endocrinol Metab*. 2006;91(9):3296-302.