Should We Approach All Pancreatic Tumors Robotically?

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Introduction

Pancreatic surgery remains one of the most challenging fields in general surgery, and the majority of pancreatic tumors are still approached via laparotomy. The aim of this study was to assess the value of approaching every pancreatic tumor robotically to increase the rate of successful minimally invasive resections and reduce unuseful laparotomies. We compared our robotic surgery peri-operative data and outcomes versus open and laparoscopic approaches from the literature.

Methodology

A retrospective review of our medical records identified 84 patients who underwent robotic pancreatic cancer surgery from November 2012 to February 2023. Perioperative data and patient outcomes were assessed by retrospective review of a prospectively maintained database.

Results

84 patients underwent robotic-assisted surgery for pancreatic cancer, where one group (n=46) underwent distal pancreatectomy, and another group (n=38) underwent pancreatoduodenectomy. The mean age was 62.4±12.7 and 62.6±14.9 years, respectively. The mean operative time was 211.7±48.9 and 409.4+27.4. Mean estimated blood loss was 126.5±85.0 and 268.8±226.7. R0 was achieved in 94.9% and 76.7% of cases. The mean lymph node harvest was 9.1±7.3 and 19.03±11.59. No intraoperative complications were noted. The conversion rate was 17.9% and 56.4%. Postoperative morbidity was 23.8% and 38.9%. One patient (2.6%) who underwent pancreatoduodenectomy required reoperation. The mean length of stay was 6.9±2.3 and 13.7±3.2. There was no postoperative mortality.

Conclusions

In our experience, robotic-assisted pancreatic surgery is associated with a similar length of stay, operative time, and lymph node yield but **reduced blood loss, morbidity, and mortality rates compared to open and laparoscopic approaches.**

Table 1. Robotic versus Open and Laparoscopic Distal Pancreatectomy Results (Retrospective studies)

Study	Patients, n	Type of Approach [open (O), laparoscopy (L), robotic (R)]	Pathology	Median values					Postoperative morbidity (%)	Reoperation (%)	90-day mortality (%)
				Surgery time (min)	EBL (mL)	LN harvest (count)	R0 (%)	LOS (days)			
Hilst et *al.* 2017	856	O	Pancreatic Neoplasms*	240	300	18	60	9	22**	NA	4
Magge et *al.* 2013	34	O	Pancreatic Adenocarcinoma	294	570	12	88	8	50	0	0
Magge et *al.* 2013	28	L	Pancreatic Adenocarcinoma	317	290	11	86	6	39	0	0
Hilst et al. 2017	356	L	Pancreatic Neoplasms*	239	200	14	67	8	17**	NA	2
Our Experience	46	R	Pancreatic Neoplasms*	206	100	9	94	6	24	0	0

*EBL - Estimated blood loss; LN - lymph node; R0 - Resection margins free of neoplastic involvement; LOS - Length of stay; * - These include: pancreatic adenocarcinoma, neuroendocrine tumor and other benign and malignant pancreatic conditions; ** - Only complications with Clavien-Dindo score ≥3 were reported; NA - Not available.*

Table 2. Robotic versus Open and Laparoscopic Pancreaticoduodenectomy Results (Retrospective studies)

Study	Patients, *n*	Type of Approach [open (O), laparoscopy (L), robotic (R)]	Pathology	Mean values					Postoperative morbidity (%)	Reoperation (%)	90-day mortality (%)
				Surgery time (min)	EBL (mL)	LN harvest (count)	R0 (%)	LOS (days)			
Wang et al. 2018	178	O	Pancreatic Neoplasms*	410	502	12	94	27	48	NA	0
Varley et *al.* 2019	149	O	Pancreatic Neoplasms*	432	500	NA	81	10	NA	8.1	2.7
Stauffer et *al.* 2016	193	O	Pancreatic Adenocarcinoma	375	600	17	80	9	67	6.2	5.2
Stauffer et *al.* 2016	58	L	Pancreatic Adenocarcinoma	518	250	27	85	6	53	1.7	3.4
Our Experience	38	R	Pancreatic Neoplasms*	409	269	19	77	14	39	2.6	0

*EBL - Estimated blood loss; LN - lymph node; R0 - Resection margins free of neoplastic involvement; LOS - Length of stay; * - These include: pancreatic adenocarcinoma, neuroendocrine tumor and other benign and malignant pancreatic conditions; ** - Only complications with Clavien-Dindo score ≥3 were reported; NA - Not available.*