

Surgery for pancreatic head cancer

Pancreaticoduodenectomy (PD) offers the only chance of long-term survival for patients with pancreatic head cancer. The procedure involves removing the pancreatic head together with the duodenum, gallbladder and most of the common extra hepatic bile duct (Fig. 1a). Two aspects of PD are still debated: which lymph nodes (LNs) should be removed (Fig. 1a and 1b) and the usefulness of partial resection of the mesenteric-portal trunk. Here we analyze the first aspect.

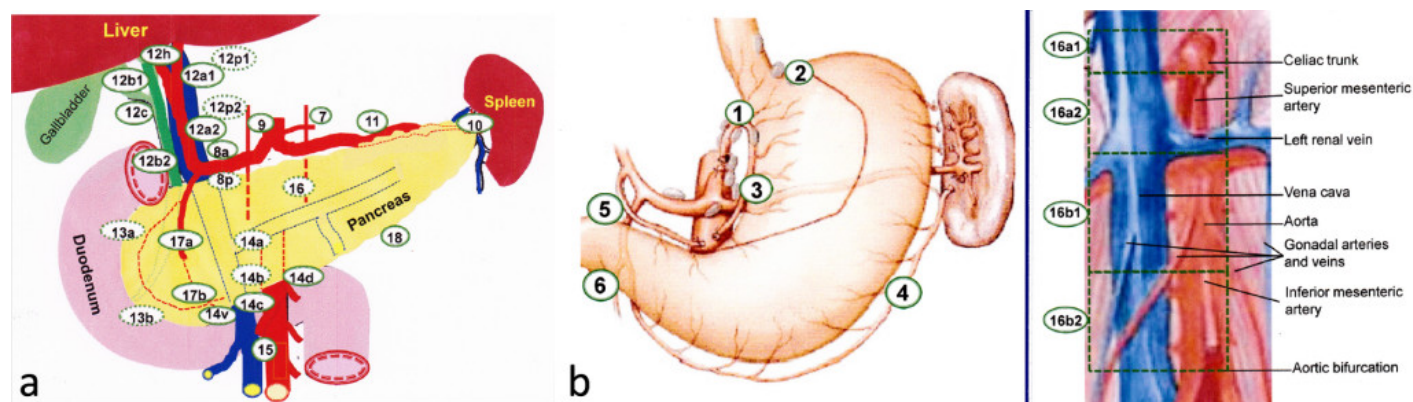


Fig. 1. a. Japan Pancreas Society nomenclature for perigastric, peripancreatic and para-aortic lymph nodes potentially removed during a standard or extended lymphadenectomy. Lymph node stations: along the left gastric artery (7); along the common hepatic artery (8a, 8p); around the celiac trunk (9); at the splenic hilum (10); along the splenic artery (11); along the proper hepatic artery (12a); along the bile duct (12b); along the cystic duct (12c); behind the portal vein (12p); hilar area (12h); on the posterior surface of the pancreatic head (13a, 13b); at the origin of the superior mesenteric artery (SMA) (14a); on the right side of the SMA (14b); on the anterior surface of the SMA at middle colic artery (14c); on the left side of the SMA (14d); along the middle colic vessels (15). on the anterior surface of the pancreatic head (17a, 17b); along the inferior border of the body and tail of the pancreas (18).

Peripancreatic arteries in red, mesenteric-portal trunk in blue, biliary tree in green.

b. Left: perigastric lymph node stations: right paracardial (1); left paracardial (2); along the lesser curvature (3); along the greater curvature (4); suprapyloric (5); infrapyloric (6). Right: para-aortic nodes: from diaphragm to celiac trunk (16a1); from celiac trunk to left renal vein (16a2); from left renal vein to inferior mesenteric artery (16b1); from inferior mesenteric artery to aortic bifurcation (16b2).

Unsatisfactory long-term survival after PD prompted Fortner to propose radical pancreatic resection in 1973. While the technique was rarely used in the west, Japanese pancreatic surgeons adopted Fortner's extended LN dissection. Retrospective studies, prospective randomized studies, systematic reviews and meta-analyses cast doubts on the usefulness of extended

lymphadenectomy, however. The need to standardize surgery for pancreatic head cancer prompted the proposals summarized in Table 1. Taking a different approach, we suggest a standardized lymphadenectomy based on the answers to following questions:

Is there a minimum total number of LNs examined (TNLE) that can guarantee adequate tumor staging? Answer: it is almost generally agreed that at least 15 LNs need to be examined to ensure an adequate tumor staging.

How many LNs can be retrieved from the different LN stations? Answer: only one study reports the mean number of LNs retrieved from each station, and far more LNs were removed per patient (42.4) in this study than in most others (5-17). Few LNs (0.4 – 2.4) are retrieved from stations 1-5, 7-11, 15, 18. Standard lymphadenectomy can therefore presumably generate an adequate TNLE for pathological tumor staging purposes, but as many as one in two patients may have had not enough LNs examined.

Which LN stations are at highest risk of metastasis? Answer: the weighted average incidence of metastatic disease involving the various LN stations was 75% for stations 1-5, 9, 11, 15 and 18; 8.4% for station 6; between 11.2% and 18.4% for stations 8, 12, 14, and 16; 24.5% for station 17 and 39.8% for station 13. These data derive from a literature review involving at least 385 patients for stations 1-5, between 461 and 795 patients for stations 6, 8, 9, 11, 12, 15 and 18, and between 3212 and 3725 patients for stations 13, 14, 16, and 17.

Can we identify suspect LN stations pre- and/or intra-operatively? Answer: LN size ≥ 10 mm is not a reliable parameter for assessing metastatic involvement. Preoperative Imaging studies yield disappointing results, 18-FDG PET included. In particular, 86% of pN1 patients had no LNs larger than 10 mm, and most nodes are ≥ 5 mm. Even analyses on frozen sections of harvested para-aortic LNs only reach a sensitivity of 71%, albeit with a 100% specificity

Can a different extent of lymphadenectomy influence how accurately analyzing LN status predicts survival? Answer: LN metastasis is one of the most relevant prognostic factors after pancreatic cancer resection. The prognostic value of LN status can depend on the total number of positive LNs identified, the LN ratio, or the log odds of positive LNs. It is easy to see that varying the number of resected LN stations at low risk of metastasis, and/or omitting one or more LN stations at significant risk of metastasis will negatively affect the accuracy of all these refined methods. Positive para-aortic LNs negatively influence a patient's prognosis and, if confirmed intraoperatively, may contraindicate resection in fragile patients.

Table 1. Proposed standardizations of lymphadenectomy in surgery for pancreatic head cancer.

Author	Lymphadenectomy	Lymph node stations to be removed				
Pedrazzoli S, et al. Dig Surg 1999; 16: 337-345.	Standard	12b,c, 13a,b; 14a,b; 17a,b.				
	Radical	8a,p; 9, 12a,b,c,p,h; 13a,b; 14a,b,c,d,v; 16a2,b1, 17a,b.				
	Extended radical	8a,p; 9, 12a,b,c,p,h; 13a,b, 14a,b,c,d,v; 16a1,a2,b1,b2; 17a,b.				
Samra JS, et al. ANZ J Surg 2008; 78: 228-236.	En bloc resection	4; 8a,p; 9; 12a,b, p; 13a,b; 14*; 15; 16a1,a2,b1; 17a,b.				
Tol JAMG, et al. Surgery 2014; 156: 591-600.	Standard	5; 6; 8a; ‡ 12 b,c; 13a,b, 14a,b; ‡ 17a,b.				
Our proposal	Standard	6; 8a,p; 12a,b,c; 13a,b, 14a,b,c,d; 16b1; 17a,b.				

*: not better specified. ‡: no strong recommendation could be given on the routine resection of 8p and 16b1.

Based on the above considerations we propose a standard lymphadenectomy that includes all the LN stations at high risk of metastasis, since the resulting TNLE will guarantee that at least 15 LNs are retrieved in the majority of patients.

Publication

[Extent of lymphadenectomy to associate with pancreaticoduodenectomy in patients with pancreatic head cancer for better tumor staging.](#)

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