

Supplementary Materials: The Impact on Survival and Morbidity of Portal–Mesenteric Resection During Pancreaticoduodenectomy for Pancreatic Head Adenocarcinoma: A Systematic Review and Meta-Analysis of Comparative Studies

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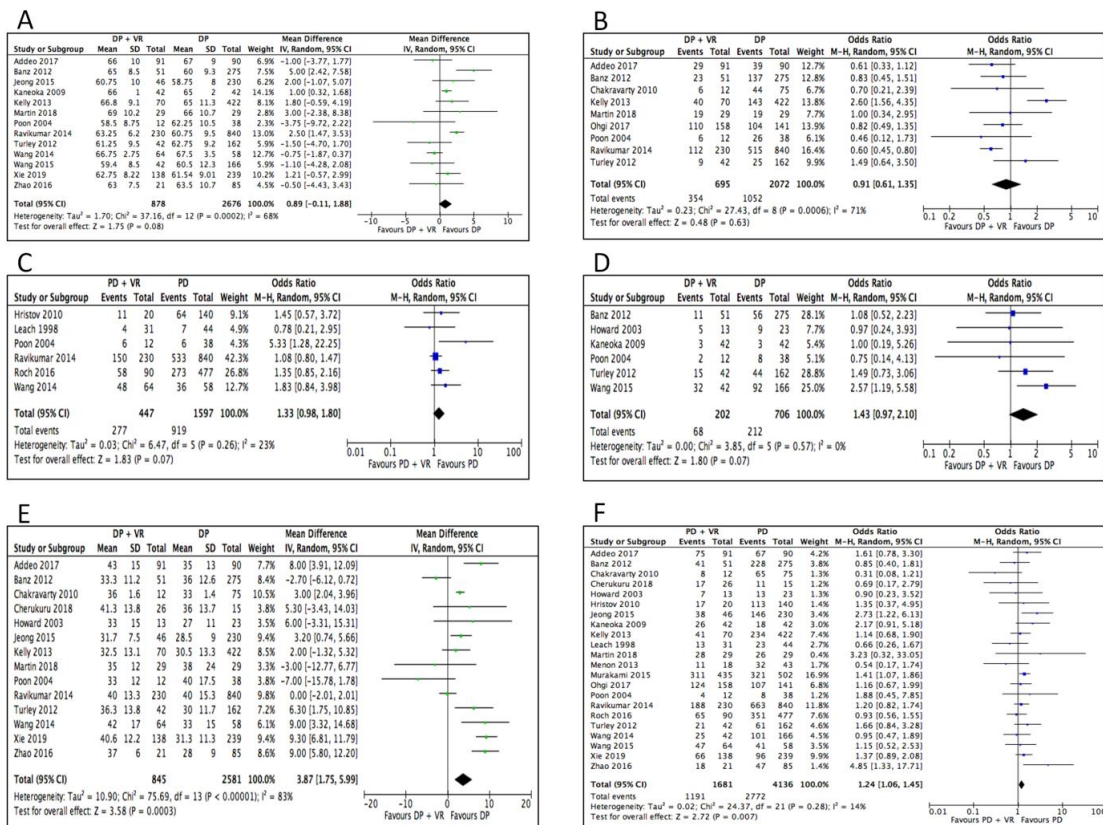
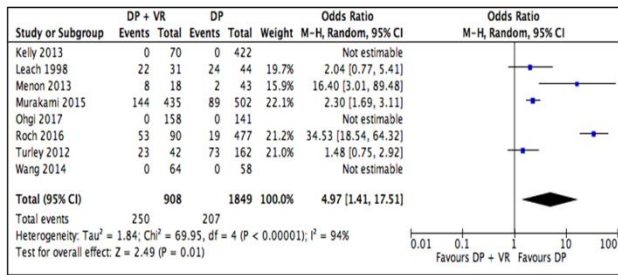


Figure S1. Meta-analysis of patients and tumor characteristics. (A) Age. (B) Need for preoperative biliary drainage. (C) Lymphovascular invasion. (D) Poorly differentiated. (E) Tumor size. (F) Positive lymph nodes.

A



B

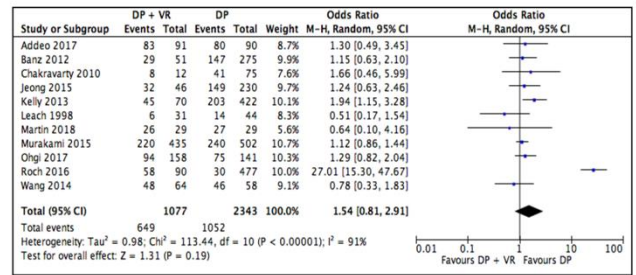


Figure S2. Meta-analysis of use of neoadjuvant chemotherapy (A) and adjuvant chemotherapy (B).

Table S1. Full electronic search strategy used for online databases and data extraction, inclusion and exclusion criteria.

Keyword used and combined for the search*	PubMed**	Scopus**	WOS**
Pancreaticoduodenectomy	8.555	16.402	5.956
Duodenopancreatectomy	8.674	743	362
Whipple OR Kaush-Wipple operation	3.864	1.131	4.368
Venous resection	9.506	9.650	6.124
Portal resection	5.209	10.905	7.007
Mesenteric vein resection	1.084	2.365	1.054
Portal-mesenteric OR porto-mesenteric resection	92	32	106
Pancreatic carcinoma	4.990	38.942	30.095
Pancreatic head carcinoma	2.710	3.680	2.910

* systematic literature search using the specified databases was performed in December 2019.

**number of hits

Inclusion criteria:

- Studies comparing surgical outcomes and survival outcomes of PD with portal-mesenteric vein resection (PD+VR) and standard PD in patients with PHAC.
- Studies containing a previously unreported patient group.

Exclusion criteria:

- Studies including tumors other than pancreatic adenocarcinoma (such as ampullary carcinoma, cholangiocarcinoma, primitive duodenal cancer, and malignant neuroendocrine tumors);
- Studies including pancreatic cancer treated with total pancreatectomy or distal pancreatectomy;
- Studies including patients in whom also arterial resection was carried out along with portal-superior mesenteric resection.

Table S2. Critical appraisal of included studies using Newcastle Ottawa scale.

Study, year	Stars number			Total
	Selection ^a	Comparability ^b	Outcome ^c	
Leach, 1998 [31]	4	0	3	7
Howard, 2003 [29]	4	0	3	7
Poon, 2004 [36]	3	0	3	6
Kaneoka, 2009 [26]	4	0	4	8
Toomey, 2009 [39]	2	0	3	5
Chakravarty, 2010 [24]	4	0	3	7
Hristov, 2010 [28]	3	0	3	6
Banz, 2011 [23]	3	0	3	6
Turley, 2012 [40]	3	0	3	6
Kelly, 2013 [27]	3	0	3	6
Menon, 2013 [33]	3	0	3	6
Wang, 2014 [41]	4	0	3	7
Ravikumar, 2014 [37]	4	0	3	7
Wang, 2015 [8]	3	0	3	6
Jeong, 2015 [30]	3	0	3	6
Murakami, 2015 [34]	4	0	3	7
Zhao, 2016 [43]	3	0	3	6
Roch, 2016 [38]	3	0	3	6
Ohgi, 2017 [35]	3	0	3	6
Addeo, 2017 [12]	4	0	3	7
Martin, 2018 [32]	4	1	3	8
Cherukuru, 2018 [25]	3	0	3	6
Xie, 2019 [42]	3	1	3	7

^a Maximum 4 stars; ^b Maximum 2 stars; ^c Maximum 3 stars.

Table S3. Type of venous resection and reconstruction performed in the patients of the PD+VR group.

Author	Type of Venous resection and Venous Reconstruction
Addeo P [12]	End-to-end anastomosis: 91 (100%)
Banz VM [23]	Primary anastomosis: 48 (94.1%) Donor vein: 2 (3.9%) Autologous vein: 1 (2%)
Chakravarty K [24]	End-to-end anastomosis: 9 (75%) Autologous graft: 1 (8.3%) PTFE graft: 2 (16.7%)
Cherukuru R [25]	Segmental resection: 25 (96.2%) Sleeve resection: 1 (3.8%) Primary anastomosis: 12 (46.2%) Autologous vein graft: 10 (38.5%) PTFE graft: 3 (11.5%)
Howard TJ [29]	End-to-end anastomosis: 6 (46%) Lateral venorrhaphy: 5 (38%) [one with saphenous vein patch] Resection and interposition vein graft 2 (15%)
Hristov B [28]	Primary closure: 12 (60%) End-to-end anastomosis: 6 (30%) Interposition grafts: 2 (10%) [one autologous saphenous vein; one PTFE graft]
Jeong J [30]	Partial vein resection with primary closure: 12 (26.1%) Segmental resection with anastomosis: 34 (73.9%) [1 cadaveric vein graft; 1 autologous saphenous vein graft]
Kaneoka Y [26]	End-to-end anastomosis: 27 (64.3%) External iliac vein interposition graft: 15 (35.7%)
Kelly KJ [27]	Tangential or segmental vein resection: 70 (100%)

Table S3. *Cont.*

Leach SD [31]	Saphenous vein patch: 4 (12.9%) End-to-end anastomosis with ligation and division of the splenic vein: 8 (25.8%) Primary end-to-end anastomosis without ligation and division of the splenic vein: 7 (22.6%) Internal jugular vein interposition graft: 11 (35.5%) Gore-Tex interposition graft: 1 (3.2%)
Martin D [32]	End-to-end anastomosis: 20 (69%) PTFE graft: 6 (21%) Wedge resection with direct closure: 3 (10%)
Menon VG [33]	End-to-end anastomosis: 12 (67%) Internal jugular vein graft: 1 (5.6%) Renal vein graft: 2 (11.1%) Synthetic graft: 3 (16.7%)
Murakami Y [34]	Wedge resection: 76 (17.5%) Segmental resection: 353 (81.1%) End-to-end reconstruction: 323 (91.5%) Autologous vein interposition graft: 30 (8.5%)
Ohgi K [35]	Tangential wedge resection: 17 (12%) Segmental resection: 125 (88%)
Poon RT [36]	Wedge resection: 4 (33.3%) End-to-end anastomosis: 8 (66.7%)
Ravikumar R [37]	Primary closure: 129 (56.1%) End-to-end anastomosis: 65 (28.3%) Interposition graft: 36 (15.7%)
Roch AM [38]	End-to-end anastomosis: 67 (74.4%) Internal jugular vein graft: 19 (21.1%) Renal vein graft: 1 (1.1%) Saphenous vein graft: 1 (1.1%) PTFE graft: 2 (2.2%)
Toomey P [39]	Lateral venorrhaphy: 44 (91.6%) Saphenous vein graft: 2 (4.2%) End-to-end anastomosis: 2 (4.2%)
Turley RS [40]	Primary repair: 8 (19%) Vein patch: 25 (59.5%) Interposition graft: 9 (21.4%)
Wang F [41]	End-to-end anastomosis: 54 (84.4%) Lateral venorrhaphy: 9 (14.1%) Synthetic graft: 1 (1.6%)
Wang WL [8]	End-to-end anastomosis: 28 (66.7%). Interposition venous allograft (portal veins or iliac arteries from liver transplant donors): 14 (33.3%)
Xie ZB [42]	Primary closure of the vein, and reconstructed with PTFE vascular grafts: 138 (100%)
Zhao X [43]	Interposition of Iliac vein from cadaver donor: 21 (100%)



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