

Supplementary Table 1 - Donor and Recipient Characteristics Predictive of Pancreas Allograft Thrombosis (NS = not specified)

Donor & Recipient factors	Graft thrombosis
Agarwal, 2005	---
Alonso, 2008	---
Becker, 2007	---
Ciancio, 2000	---
Decraemer, 2004	---
Douzdjian, 1995	Donor Brain death to procurement >15 hours was associated with increased graft failure. No specific analysis of thrombosis risk factors.
Englesbe, 2006	---
Grewal, 1993	5/18 male recipient pancreas transplantations experienced thrombosis, compared to 1/23 female recipients (P = 0.04)
Gruessner, 1997	Cardiocerebrovascular cause of donor death (vs traumatic) was identified as an independent risk factor for graft thrombosis (RR = 5.2, P =0.02)
Gruessner, 2016	Donor age >44 years old posed an increased thrombotic risk in all three groups (SPK, PAK, PTA) when compared to <44 year old donors, but only reached significance in SPK (P = 0.007). Increasing recipient age demonstrated a decreasing thrombosis rate (30-44 vs >44) in all three groups, significant in PAK (P = 0.03) Recipient BMI >30 (vs BMI <30) increased rate of thrombosis in all 3 groups, reaching significance in SPK (P = 0.013) Cardiocerebrovascular cause of death (vs traumatic) increased thrombosis rate in all 3 groups, significantly in SPK (P = 0.002) and PTA (P=0.002) Panel reactive antibodies (PRA) >20% (vs <20%) increased relative risk of thrombosis in all 3 groups, significantly in SPK (P = 0.01)
Hakeem, 2018	---
Harbell, 2017	---
Hau, 2014	---
Hesse, 2005	---
Humar, 2000	Increasing donor age correlated with increasing thrombosis incidence, 1.8% for <20 years old, 3.7% for 20-40 years old, 16.2% for >40 year olds (P = 0.009). 2.6% of pre-transplant dialysis recipients thrombosed, 8.0% of non-dialysis recipients thromboses (P = 0.04)
Humar, 2004	Recipient BMI \geq 30 (vs <30) had a 2.42 times greater relative risk of technical failure (P = 0.0003). Non-traumatic cause of donor death (vs traumatic) increased technical failure risk (P = 0.04)
Humar, 2004	Incidence of graft thrombosis significantly increased with BMI (<25 = 4.8%, 25-30 = 12.2%, >30 = 14.8%; P = 0.03). BMI >30 (vs \leq 30) increased overall technical failure (RR=1.7, P=0.005)
Ionescu, 2007	---
Jimenez, 2005	---
Jimenez-Romero, 2018	---
Karam, 2005	---
Kopp, 2018	---
Lindahl, 2018	---

Manrique, 2009	---
Martins, 2015	Two cases of thrombosis occurred in the 119 recipients on pre-transplant haemodialysis, five cases occurred in the 39 recipients on pre-transplant peritoneal dialysis (P = 0.014)
Montiel-Casado, 2012	---
Okabe, 2013	---
Ozaki, 1992	---
Page, 2012	---
Raiha, 2019	---
Ramessur Chandran, 2013	---
Raveh, 2019	Recipient abnormal platelet function assay (collagen-epinephrine & Collagen-ADP) associated with 4.9x increased risk of pancreatic allograft thrombosis (P=0.004)
Sanchez-Hidalgo, 2018	---
Scheffert, 2014	Hypercoagulability (documented protein C or protein S deficiency or antiphospholipid antibodies) was a predictor of early graft loss resulting from thrombosis (P = 0.035)
Schneeberger, 2009	---
Spaggiari, 2018	---
Troppmann, 1996	One-year incremental increase in donor age associated with increasing thrombosis risk (P = 0.05). Thrombosis after SPK. PAK and PTA transplantations trended towards older recipient age Median recipient age of PAK transplantations resulting in thrombosis was 44 years old compared with 22 years old without thrombosis (P = 0.03). 16% of transplants from donors after cardiocerebrovascular death resulted in thrombosis, compared to 8% in transplants from all other causes of death (P = 0.03)
Troppmann, 1998	---
Vincent, 2014	Donor BMI $\geq 25\text{kg/m}^2$ (vs. <25) increased thrombosis (P= <0.01) Recipient BMI $\geq 25\text{kg/m}^2$ (vs. <25) increased thrombosis rate (P= <0.05)
Cantarovich, 2016	---
Choi, 2019	---
Ferrer, 2019	---
Finger, 2012	Increased technical failure with donor age >50 (P = 0.0010), donor BMI $>30\text{kg/m}^2$ (P = 0.003). Donor history of pancreatitis and creatinine ≥ 2.5 both increased technical failure (P = <0.001 , P = 0.002)
Graham, 2017	---
Gruessner, 2014	Recipient obesity (not defined) and PRA levels (not specified) were risk factors for thrombosis (P = NS)
Gruessner, 2012	---
Horneland, 2012	Higher donor age had a significant negative impact on relaparotomy rate (P = NS)
Horton, 2012	Patients with top quartile of pre-transplant insulin requirements ($>0.88\text{u/kg/d}$) experienced 52% of pancreas graft failures (primarily due to thrombosis), resulting in 76% one-year graft survival versus 94% in those requiring lower doses (P = <0.0001)
Jimenez-Romero, 2009	---
Koyama, 2018	---

Kudva, 2013	---
Lin, 2013	Donor age associated with development of a surgical complication (P = NS)
Martins, 2013	---
Patil, 2014	---
Ramessur, 2010	---
Rogers, 2011	---
Rogers, 2013	---
Scheffert, 2010	---
Shahrestani, 2018	25.6x increased risk of thrombosis in male donors compared with female donor following SPK transplantation (P=0.01). Recipients aged 37-42 are at 10.6x greater risk of thrombosis than recipients <36 years old (P=0.02). Donor age trended non-significantly towards increased risk of pancreas allograft thrombosis.
Singh, 2012	Recipient BMI >30kg/m ² correlated with increased graft loss due to vascular complications (thrombosis and bleeding).
Sutherland, 2009	---
Hameed, 2017	---
Shahrestani, 2017	DCD donors have a 1.67 times higher rate of thrombosis than their DBD counterparts (P = 0.006). However, thrombosis was not higher when DCD donors were given ante mortem heparin (P = 0.62)

Supplementary Table 2 – Procurement and Preservation factors predictive of Pancreas Allograft Thrombosis (NS = not specified)

Procurement & Preservation factors	Graft thrombosis
Agarwal, 2005	---
Alonso, 2008	Thrombosis in 3 of 16 HTK-preserved versus 3 of 81 UW-preserved pancreas transplants (P = 0.05)
Becker, 2007	---
Ciancio, 2000	---
Decraemer, 2004	---
Douzdjian, 1995	---
Englesbe, 2006	---
Grewal, 1993	Cold ischaemia time greater than 12 hours conferred an increased risk of thrombosis. Mean CIT for thrombosis group was 15.9 hours, and 10.8 hours for non-thrombosis (P < 0.05)
Gruessner, 1997	---
Gruessner, 2016	Total preservation time greater than 24 hours trended toward increased thrombosis in all 3 transplant groups, reaching significance in SPK group (P = 0.005)
Hakeem, 2018	---
Harbell, 2017	---
Hau, 2014	---
Hesse, 2005	---
Humar, 2000	---
Humar, 2004	Total preservation time greater than 24 hours was 1.87x more likely to technically fail than 24 hours (mean = 19.9, P = 0.04)
Humar, 2004	Total preservation time greater than 24 hours (vs <24 hours) increased incidence of technical failure (P = 0.005)
Ionescu, 2007	---
Jimenez, 2005	---
Jiminez-Romero, 2018	---
Karam, 2005	---
Kopp, 2018	---
Lindahl, 2018	---
Manrique, 2009	---
Martins, 2015	---
Montiel-Casado, 2012	Mean cold ischaemia time for thrombosis was 11.5 hours, non-thrombosis was 9.4 hours (P = 0.025) Total preservation time for thrombosis group was 12.6 hours, non-thrombosis group was 10.5 hours (P = 0.023).
Okabe, 2013	---
Ozaki, 1992	---
Page, 2012	---
Raiha, 2019	---
Ramessur Chandran, 2013	---

Raveh, 2019	Increased risk of graft thrombosis with mean pancreas warm ischaemia time of 30 minutes versus 25 minutes (odds ratio 1.1, P = 0.02)
Sanchez-Hidalgo, 2018	---
Scheffert, 2014	---
Schneeberger, 2009	---
Spaggiari, 2018	---
Troppmann, 1996	---
Troppmann, 1998	---
Vincent, 2014	---
Cantarovich, 2016	Increased cold ischaemia time associated with more venous thrombosis (mean = 12.7, P = NS)
Choi, 2019	---
Ferrer, 2019	---
Finger, 2012	Total preservation time >20 hours increased technical failure (P = 0.002). Bladder drainage (vs. enteric drainage) was protective of technical failure (P=0.003)
Graham, 2017	---
Gruessner, 2014	---
Gruessner, 2012	---
Horneland, 2012	---
Horton, 2012	---
Jimenez-Romero, 2009	---
Koyama, 2018	---
Kudva, 2013	---
Lin, 2013	---
Martins, 2013	---
Patil, 2014	---
Ramessur, 2010	---
Rogers, 2011	---
Rogers, 2013	---
Scheffert, 2010	---
Shahrestani, 2018	---
Singh, 2012	---
Sutherland, 2009	---
Hameed, 2017	Increased peak lipase with HTK solution compared with UW. Nil change in thrombosis or graft survival rates.
Shahrestani, 2017	---

Supplementary Table 3 – Transplantation and Post-operative Factors predictive of Pancreas Allograft Thrombosis (NS = not specified)

Transplantation & Post-operative factors	Graft thrombosis
Agarwal, 2005	---
Alonso, 2008	---
Becker, 2007	---
Ciancio, 2000	IV Tacrolimus immunosuppression used in all 14 cases of venous thrombosis, appears to be a risk factor
Decraemer, 2004	---
Douzdjian, 1995	---
Englesbe, 2006	---
Grewal, 1993	---
Gruessner, 1997	<p>Y-graft arterial reconstruction sustained thrombosis in 10% of PTx's which was significantly less than all other reconstructive methods used (21% thrombosis with end-to-end anastomosis between splenic artery and SMA, 16% thrombosis with interposition graft between splenic artery and SMA) ($P < 0.15$ – significance cut off used).</p> <p>Increased thrombosis rate with left sides graft placement when compared to all others (medial + right sided) ($p = 0.01$)</p> <p>Thrombosis rates were 15% with use of a portal vein extension graft and 11% without, however did not reach significance ($P = NS$)</p>
Gruessner, 2016	<p>Enteric drainage resulted in a greater rate of thrombosis than bladder drainage in SPK transplants ($P = 0.03$)</p> <p>Depleting T-cell antibody induction therapy [alemtuzumab, OKT3, ATGAM] (vs non—depleting) reduced thrombosis ($P = 0.0005$).</p> <p>Tacrolimus and MMF protocol for maintenance immunosuppression decreased relative risk of thrombosis ($P = <0.0001$, all 3 groups, as did Sirolimus protocol (SPK; $P = 0.001$, PTA; $P = 0.007$, PAK; $P = NS$).</p> <p>High volume centres (>10 PTx/year) associated with decreased relative risk of thrombosis compared with small (<5 PTx/year) or medium (5-10 PTx/year), significance in High vs Small PAK ($P = 0.002$) and PTA ($P = 0.007$).</p>
Hakeem, 2018	<p>Pancreas after SPK/Pancreas after kidney transplants incurred 9% greater vascular thrombosis risk compared with SPK (OR 1.09, $P = 0.047$)</p> <p>Acute rejection increased thrombosis risk by 25% (OR 1.25, CI 1.07-1.90, $P = 0.034$).</p> <p>CT findings of pancreatitis increased thrombosis rates by 23% (OR 1.23, CI 1.08-1.72, $P = 0.011$)</p>
Harbell, 2017	<p>Non-occlusive SV thrombi can be managed safely with anticoagulation alone.</p> <p>Prophylactic antiplatelet therapy and therapeutic unfractionated heparin does not significantly increase risk of bleeding complications (Transfusions in first 72h $P=0.82$, gastrointestinal bleeding requiring transfusion $P=0.47$, Required return to OR for bleeding complications $P=0.67$)</p>
Hau, 2014	---
Hesse, 2005	---
Humar, 2000	Post-transplant prophylactic heparin and ASA recipients had a 4.0% incidence of thrombosis; the incidence was 10.8% in those who did not ($P = 0.06$)
Humar, 2004	---

Humar, 2004	---
Ionescu, 2007	---
Jimenez, 2005	Thrombosis occurred in 7 of 30 pancreas grafts with portoiliac drainage compared with 0 of 23 grafts with portocaval drainage (P < 0.02)
Jiminez-Romero, 2018	Venous and arterial thrombosis both strongly associated with graft loss, occurring in 21 of 22 cases (P = 0.000)
Karam, 2005	---
Kopp, 2018	---
Lindahl, 2018	---
Manrique, 2009	Relaparotomy rate for thrombosis was 18.2% with exocrine bladder drainage and 5.8% for enteric draining grafts (P < 0.05)
Martins, 2015	---
Montiel-Casado, 2012	Peak amylase >745mg/dL (one standard deviation above mean) occurred in 3 of 8 thrombosis cases, and 4 of 50 non-thrombosis cases (P = 0.032); an 8.6 times greater risk of vascular thrombosis
Okabe, 2013	---
Ozaki, 1992	---
Page, 2012	---
Raiha, 2019	---
Ramessur Chandran, 2013	Intra-operative hypotension (systolic blood pressure <95mmHg) occurred in 10 of 12 thrombosis and 54 of 106 non-thrombotic cases (P = 0.033) On-ward hypotension (sBP < 95mmHg) occurred in 4 of 12 thrombosis and 8 of 106 non-thrombosis patients (P = 0.007) Vasopressors were required in 11 of 12 transplantations that resulted in thrombosis and in 58 of 106 transplants without thrombosis (P = 0.022)
Raveh, 2019	Exocrine drainage increased risk of thrombosis compared to bladder drainage (21/43 thrombosed vs 15/52 thrombosed) (P=0.006) Increased graft thrombosis with non-iv heparin regimen (30/63) compared with iv heparin thromboprophylaxis (6/32) (P=0.01), however increased bleeding risk with iv heparin.
Sanchez-Hidalgo, 2018	---
Scheffert, 2014	Patients who received heparin had a higher incidence of partial thrombosis (10% vs 3%, P = 0.123), lower complete thrombosis (94% vs 85%, P = 0.116), and higher graft survival at 30 days (94% vs 85%, P = 0.116) compared to patients who did not receive heparin – however none reached significance.
Schneeberger, 2009	---
Spaggiari, 2018	---
Troppmann, 1996	33 thrombosis resulted after 329 right-side placement pancreas grafts (11%), 10 thrombosis after 41 left-sided grafts (24%) (P = 0.01) All other reconstruction techniques, including no reconstruction (excluding aortic carrel patch) increased the relative risk of thrombosis compared to Y-graft (RR >25, P = 0.005). Aortic Carrel patch (vs. Y-graft) resulted in greater thrombosis (P = 0.05). Graft pancreatitis in PAK (vs. no pancreatitis), defined as hyperamylasemia exceeding 5 days post-transplantation, increased the relative risk of thrombosis by 12.7 times (P = 0.001)
Troppmann, 1998	Relaparotomy due to graft thrombosis was a significant risk factor for graft loss in SPK (P=0.0001), PAK (P = 0.0001) and PTA (P = 0.02)
Vincent, 2014	---
Cantarovich, 2016	---

Choi, 2019	---
Ferrer, 2019	---
Finger, 2012	---
Graham, 2017	---
Gruessner, 2014	---
Gruessner, 2012	---
Horneland, 2012	---
Horton, 2012	---
Jimenez-Romero, 2009	7/41 bladder-drained grafts thrombosed compared with thrombosis in 2/47 enteric-drained grafts (P = <0.03)
Koyama, 2018	Pancreas graft survival better in SPK than PAK recipients. 4 of 4 total thrombi occurred following PAK transplantation (P = 0.0206)
Kudva, 2013	---
Lin, 2013	Allograft pancreatitis (amylase threshold not stated) identified as an independent risk factor for surgical complication development (P = NS)
Martins, 2013	---
Patil, 2014	---
Ramessur, 2010	Vasopressor use associated with early pancreas graft thrombosis (P = 0.04)
Rogers, 2011	---
Rogers, 2013	---
Scheffert, 2010	Post-operative heparin use positive predictor of 30- day graft survival (P = 0.03)
Shahrestani, 2018	Presence of hypoxia insignificantly increased risk of pancreatic allograft thrombosis (OR: 4.0, 95% CI: 0.8-21.4; P=0.102)
Singh, 2012	---
Sutherland, 2009	Enteric drainage increased risk for graft failure in PAK and PTA groups (P= <0.05)
Hameed, 2017	---
Shahrestani, 2017	---