

## Evidence based management of abdominal drainage for pancreas surgery

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Prophylactic abdominal drainage has been considered as routine procedure for pancreatic resection. The rationale for drain placement was that prophylactic drainage allows early warning sign of anastomotic leakage, intra-abdominal hemorrhage, and abdominal infection so that it facilitates the early detection and timely management of postoperative complications. Moreover, prophylactic drainage helps to avoid the need for additional interventions for intra-abdominal collections by creating controlled pancreatic fistula. However, the controversy over routine drain placement has risen and many recent studies demonstrated that there was no benefit for patients after abdominal surgeries (appendectomy, cholecystectomy, colectomy and gastrectomy). Prophylactic drainage might increase the risk of ascending infection or lead to visceral organ injury. Closed suction drain could generate high negative pressure which possibly contributed to surrounding tissue damage and the formation of a fistula. Moreover, the development of imaging modalities has helped physicians to detect intra-abdominal complications early and to perform interventional drainage to effectively evacuate abdominal collections.

Management of abdominal drainage has become an important issue in pancreatic resection. In 1992, Jeekel first reported that patients without abdominal drainage had acceptable postoperative outcomes. Over the past two decades, several comparative studies released the value of abdominal drainage after pancreatic resection. These studies suggested that pancreatic resection can be safely performed without routine drainage. However, these retrospective observational studies inevitably subject to selection bias. Such selection bias is excluded in the randomized controlled trial (RCT). The first RCT was performed by Conlon et al in 2001. They reported that omitting prophylactic drainage was not associated with a significant increase in mortality or morbidity. However, the latest RCT by Van Buren et al in 2014 and by Correa-Gallego et al in 2013 demonstrated that omitting drainage after PD was associated with higher morbidity and mortality. These conflicting results lead to several systematic reviews and meta-analyses. The main issues were 1) drain vs. no drain and 2) early removal vs. late removal. Meta-analysis showed that prophylactic drainage did not have benefit on clinical outcomes. However, in subgroup analysis, omitting prophylactic abdominal drainage after pancreatoduodenectomy led to a significant

increase in mortality. Therefore, some authors suggested selective drain placement according to the risk of pancreatic fistula. McMillan et al reported that moderate and high risk of CR-POPF should undergo routine drainage and in patients with low risk, drain should be left to the discretion of the surgeon. A useful model for determining the risk of POPF is the fistula risk score (FRS). Van Buren et al reported that moderate and high risk of CR-POPF should undergo drain placement. Early drain removal represents a middle ground between the drain vs no drain. Studies comparing early vs late removal showed superior results for early drain removal. Bassi et al conducted RCT for this issue and reported that in patients at low risk of pancreatic fistula, intra-abdominal drains can be safely removed on POD 3 after standard pancreatic resections. A prolonged period of drain insertion is associated with a higher rate of postoperative complications with increased hospital stay and costs.

Surgical complications develop from various reasons. So, it is very hard to say whether the complications seen with the use of drains are from the drain itself or from other factors. With the development of surgical technique and equipment, postoperative complications after pancreatectomy will subsequently decrease. Therefore, the prophylactic routine drainage will not be a routine but will be selectively used depending on the presence of predicting factors for complication.