# Impact of Obesity on Outcomes after Pancreatectomy for Pancreatic Cancer

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The incidence of obesity has dramatically increased the world over (1). Obesity is a low grade pro-inflammatory state (2) and contributes to the generation of mediators potentially involved in the induction of the systemic inflammatory response (3).

In addition to the effects of obesity on general human health, obesity has also been linked to the fat content of the pancreas in experimental models (4) and in humans (5). Pancreatic fat has been shown to negatively influence not only endocrine function (6) but also the exocrine function. Hong et al. (7) recently analysed the relationship between a high body mass index and the risk of developing acute pancreatitis (AP) as well as the risk of morbidity and found that obesity is not only associated with an increased risk of AP development, but it is also a poor prognostic factor for AP.

Pancreatectomy (pancreatoduodenectomy or PD and distal pancreatectomy) offer the only option for cure in resectable, non-metastatic pancreatic cancer (8). However, pancreatic surgery is technically challenging and fraught with a significant risk of morbidity and even mortality (9).

Obesity can potentially influence the outcomes of pancreatic cancer in two major ways:

1) In murine experimental models, obesity has been shown to alter the adipokine milieu and cause insulin resistance which in turn may lead directly to changes in tumor microenvironment, thereby promoting pancreatic cancer growth and dissemination (10)
2) Pancreatic steatosis –

a) It has been suggested that pancreatic steatosis may lead to dissemination of pancreatic cancer (11)
b) Pancreatic steatosis has been proposed to be a risk factor for post-pancreatectomy anastomotic leak / fistula (POPF) (12)

Based on the above data from experimental and small case control studies it would appear that obesity would be associated with a high risk of complications and poor overall outcomes following pancreatectomy. However, the clinical data available is conflicting.

House et al. (13) found a significantly higher incidence of wound infections and POPF in obese patients. Similarly, Noun et al. (14) also noted a higher incidence of POPF in obese patients following PD.

On the contrary, in a large study, Tsai et al. (15) found that obese patients had similar tumor-specific characteristics, as well as perioperative outcomes, when compared with normal weight patients. Interestingly, however, obese patients undergoing PD had an improved long-term survival.

Williams et al. (16), on the other hand, noted a substantially increased blood loss and longer operative time in obese patients undergoing PD. While the authors did note no increase in length of postoperative hospital stay or rate of serious complications, they did advise the need for consideration of the above factors when assessing patients for surgery and when counseling them about operative risk. Similarly, Balentine et al. (17), too, noted increased operative times but no increase in hospital stay or morbidity in obese patients undergoing pancreatic surgery.

Based on the limited data from the above studies, there is no convincing evidence that obesity leads to poor overall outcomes in pancreatic cancer. However, the impact of intra-abadominal fat and pancreatic steatosis on the intra-operative course and the risk of POPF in the post-operative setting deserve importance especially when consenting patients for pancreatic surgery and in the monitoring of these patients post-operatively.

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