Duodeno-Duodenostomy Enteric Drainage in Pancreas Transplantation: A novel technique using the EEA Staple

Objective: To evaluate the technical feasibility, outcomes and clinical utility of duodeno-duodenostomy using an EEA Circular Staple pancreas transplantation

Patients and Methods: This study reviewed all whole organ pancreas transplants done at our institution from January 2008 to May 2009. Pancreas transplants were performed simultaneous to a kidney (SPK), sequentially after a kidney transplant (PAK) or alone (PTA). The operative technique involved placement of the pancreas graft in a head-up configuration with arterial anastomosis to the recipient right common iliac artery and venous drainage via the recipient inferior vena cava. Stapled enteric drainage was performed in all cases using a circular stapler (DST Series™ EEA™ 21mm Single-Use Stapler with 3.5mm Staples, Covidien-AutoSuture). The allograft duodenum was anastomosed to the recipient jejunum or duodenum. Total operative time, graft survival, and major post-operative complications (bleeding, bowel enteric leak and bowel obstruction) were reviewed.

Results: From January 2008 to May 2009, 41 pancreas transplant were performed (22 SPK, 4 PAK, 15 PTA). Stapled DD was utilized in 14 patients (7 SPK, 2 PAK, 5 PTA) and the remaining 27 patients had stapled DJ (15 SPK, 2 PAK, 10 PTA). Mean operative time for SPK with DD drainage was 358 mins vs. 340 mins for DJ. Mean operative time for PTA using DD was 173 mins while for DJ it was 170 mins (P=NS). Two of 14 grafts (14%) in the DD group thrombosed. No thromboses occurred in the DJ group ($P<0.05$). Enteric leak and small bowel obstruction occurred in 1 of 27 patients in the DJ group (3.7%) and in no patient on the DD group (P=NS). Gastrointestinal (GI) bleeding was more common following DD, occurring in 4 patients (28%) vs 0 patients in the DJ group ($P<0.01$)., Endoscopy and/or angioembolization was required in 2 patients and remaining 2 patients were managed with blood transfusions alone. There were no rejection episodes in either group and all technically successful grafts remain functional.
Stricture happened to one of the two patients who had a thrombosed allograft in which the opening was closed primarily. Duodeno-jejunostomy with subsequent pancreas transplant was done for this patient

Mean follow up in both groups was 10 months, (1-18 mos).

Conclusion: Stapled DD using a circular staple is technically feasible with no increase in operative time or enteric leak. GI bleeding rates appear to be greater following DD, which may be due to the enhanced vascularity to the recipient duodenum. This adverse feature should be balanced against the benefits of endoscopic monitoring and access to the pancreatic duct conferred by DD drainage

Discussion: The different surgical techniques of whole organ pancreas transplantation can be classified broadly according to the type of exocrine drainage performed(1a). Recently, it is also classified according to the venous type of drainage used – whether it's portal or systemic.

Bladder drainage was previously the most common type of drainage performed, due to the ability to monitor the graft directly by using urinary amylase. In fact urinary amylase has almost 100% sensitivity in detecting allograft dysfunction. (1) . However due to its frequent metabolic and urologic complications like cystitis, stricture, this was replaced by the enteric type of drainage.(2) (3,4)
Based on IPTR data, pancreas transplantation done from 2000-2004, almost 2/3 of all transplant are enteric drained.(5)
Graft and patient survival rates were similar among the groups
The advantage of the bladder drainage is that graft monitoring can be done via urinary amylase and cystoscopic biopsy of the graft. (1). Enteric drainage allows biopsy to be done percutaneously whether guided by ultrasound or CT scan. Morbidity of the procedure include bowel injury, bleeding, pancreatitis and fistula formation(8,9,10)
Recently with the used of EEA staple, we were able to fashioned a duodeno-duodenostoomy drainage.
This theoretical give us the advantage to access biopsy via EGD for graft monitoring. Although initially described by De Roover(6), our technique utilize the same head up, except the portal vein is drained systemically, and we use staple to facilitate our anastomosis. Hummel also described the advantage of this technique in monitoring graft function via gastroscopy(7).
Although in our series, a biopsy had not been done yet, a case of pancreatic leak was managed endoscopically via ERCP in one of these patients by placing a stent on the duct. Showing its accessibility to endscopic biopsy.
Morbidity that we encountered was increased in bleeding at the anastomotic site, this is most likely due to the increase vascularity of the duodenum. We were able to address the problem by doing an intra-op cystoscopy of the anastomotic site via the opening of the allograft duodenum after the staple. With the help of normal saline running through the cystoscopy and occluding the proximal and distal bowel portion from the anastomosis we were able to bring down to bleeding rate to 0%.
Another morbidity we encountered is duodenal stricture after the duodenum was primarily closed after the graft thrombosed on POD1, eventually this stricture was fixed wth a duodenojejunostomy of drainage with simultaneous pancreas transplant. Although duodenum is the largest diameter of the small bowel, we still advocate duodenjejunostomy in case of an acute allograft pancreatectomy to prevent this morbidity.
The staple allow this anatomosis easily since it has two rows of staples and additional interrupted Lembert sutures is optional especially on the posterior aspect since it most of the time it is difficult to place these sutures.
In summary, more patients need to be evaluated for biopsy doing this technique to evaluate its effectiveness and reliability.

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