Duodeno-Duodenostomy Enteric Drainage in Pancreas Transplantation: A novel technique using the EEA Staple: Cleveland Clinic Experience in 10 patients

Objective: The objective of this study is to evaluate the technical feasibility of pancreas transplant with duodeno-duodenostomy using an EEA Circular Staple, at the same time report our experience and morbidity associated with it

Materials: A total of 10 patients (n=5 SPK, n = 5 PTA) underwent pancreas transplant using duodeno-duodenostomy enteric drainage were done since January of 2008. Anastomoses were done using an EEA circular staple size 21, 3.8 mm head size. By utilizing an EEA staple, we can anastomosed the allograft duodenum to the 3rd portion of the duodenum with ease.(Fig 4 show pictures – actual pictures) Since the staple has 2 layer of staple, placing Lembert suture with wide interval after the staple is really optional

Results: A total of 26 pancreas transplant were done using an EEA circular stapler. 10 out of the 26 have the enteric drainage done as a duodeno-duodenostomy. Mean operative time for SPK was 5 hour 40 minutes (4:30 – 7:49) for PTA was 2 hours and 50 minutes (2:39-3:17). . Mean operative time for SPK was 5 hour 40 minutes (4:30 – 7:49) for PTA was 2 hours and 50 minutes (2:39-3:17). 2/10 had a thrombosed graft that was removed on POD 1. Mean operative time for SPK was 5 hour 40 minutes (4:30 – 7:49) for PTA was 2 hours and 50 minutes (2:39-3:17). Defect in the duodenum was primairy repaired. 1 of this 2 patient develop duodenal stricture that need to be repaired 8 weeks post-op. There were no enteric leaks among the group. 2/10 had GI bleeding, the first one was managed conservatively, although he had 8 units blood transfusion post-operatively, the 2nd one needed angiography-embolization for control. Bleeding was confirmed at the anastomotic site via endoscopy for both cases. These bleeding episodes occurred on the two of the first three patients.
Mean follow up of 6 months, (2-10 mos), graft fuction for the remaining 8 patients are stable.

Conclusion: Duodeno-duodenostomy using EEA circular staple is technically feasible with no increase in operative time. There is no increase incidence of enteric leak. Athough GI bleeding may be greater with this technique and stricture might be more common if allograft needs to be removed. But it give advantage for it to be accessibile endoscopically for graft monitoring in case of rejection.

Discussion: The different surgical techniques of whole organ pancreas transplantation can be classified broadly according to the type of exocrine drainage performed(12). 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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