Pancreatoduodenectomy with a novel pancreato-jejunal anastomosis by the single layer long parenchymal traverse technique: a technical note with perioperative outcome

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Abstract

Introduction

Pancreatoduodenectomy (PD) is the standard of care for localized tumours of the head of the pancreas. The anastomosis between the remnant pancreas and the intestine is a high-risk anastomosis.

This study reports on the outcome of a new technique for an end to side, duct to mucosa pancreaticojejunosomy.

Patients and methods

Conventional pancreaticoduodenectomy was performed by an individual surgeon between the period of 2013-2014 and 2017-2019 on 26 patients were included for the study. The postoperative pancreatic fistula (POPF) rate was observed with pancreatic leakage grouped according to 2016 ISGEP guidelines.

Results

There were 26 patients, 9 women and 17 men who underwent pancreatoduodenectomy with pancreato-enteric anastomosis by this new method. The mean age of the patients ranged from 56.7 to 56.8 years. Adenocarcinoma of the ampulla was the most frequent indication (n=10). Post-operatively, 9 (35%) had POPF and one (4%) required a re-exploration. POPF Type A was common (n=8) and did not require any interventions, where Type C was observed in 1 (4%). The consistency of the gland or the duct size did not show any significant difference with the fistula rate.

Conclusion

The new single layer interrupted pancreaticojejunal anastomosis with a long parenchymal traverse technique is safe with acceptable outcomes.
traverse through the pancreatic parenchyma (see figure 1 and 2). Initially, the pancreatic duct and the parenchyma were arbitrarily divided into anterior and posterior layers. Anterior layer sutures go through the full parenchyma of the pancreas about 1-2 cm from the parenchymal cut end and out through the inner aspect of the duct traversing through the parenchyma catching a thick chunk of pancreatic tissue and coming out about 2-3mm through the cut end of the pancreatic duct. If the duct is very small it is dilated by using the tip of a mosquito for proper visualisation and the anterior layer sutures are placed with double-ended suture material with traversing the duct first and coming out from the parenchyma in a reverse pattern, thereby making sure the duct is properly incorporated to the stitch. Usually, the 16mm round body half circle needle is used for the smaller ducts. The needles are left as it is for the continuation of the anastomosis later on a suture guide. Four to five stitches were put across the anterior layer of the pancreatic parenchyma (Figure 1). The number of sutures for the anterior layer depended on the size of the pancreatic duct and the size of the pancreatic stump.

Note that the defect in the jejunum is made to match the pancreatic duct. Using the diathermy, a puncture hole was made on the anti-mesenteric border of the jejunal loop, and the protruding excessive mucosa was trimmed out (Figure 1).

In the posterior layer, the suture would go through pancreatic duct initially and traversing through the parenchyma similarly explained formerly. The stitch starts from the ductal side and comes out from the posterior aspect of the pancreas. Once it has traversed the pancreas the needle would go through the jejunal wall with a thick bite of the seromuscular layer and coming out catching the mucosa just at the jejunostomy opening. The stitch on the jejuna loop should catch more of the seromuscular layer (1-2cm) and a little (2-3 mm) of the mucosa. The posterior layer will again have another 4-5 sutures to incorporate the posterior aspect of the anastomosis (Figure 2). Once it was done the two ends of the jejunum and pancreas was brought together pulling on the sutures of the posterior layer as a parachuting technique (Figure 3). This was done gently and the sutures are kept without getting entangled or cutting into the pancreatic parenchyma. Once its parachuted and the ends are approximated closely the sutures will be tied and the knots will be placed inside the anastomosis (Figure 3). Once all the knots are done in the posterior layer the excessive thread is trimmed out with a very short stub.
Then a small 10 cm feeding tube with appropriate size was put across the PJ as an anastomotic stent. Next, the suture layer which is placed in the anterior layer of the pancreas was taken across one by one through the jejunal side. The suture will pass through the jejunal mucosa catching 2-3 mm, and through the jejunal wall catching about a 1-2 cm of the seromuscular layer.

Once all the anterior layer sutures were put the knots are applied with having the knot on the serosal side, buttressing on to the serosa of the jejunum (Figure 4).

Discussion
This is a case series of 26 patients who have undergone pancreaticoduodenectomy for neoplastic lesions and analysis of postoperative pancreatic fistula (POPF) rate with a new technique. It is our understanding that this technique has not been described in the literature. This also has a resemblance to Blumgart's technique of pancreaticojejunostomy [12] thus likely to be practiced by many surgeons worldwide.

This case series is single surgeon experience in a tertiary care referral centre for HPB in Sri Lanka. In this series, we observe a slightly higher number of patients with POPF (36%) in comparison with other P-J techniques [13, 14, 15]. They were all type A or biochemical leaks. These didn't alter the clinical outcome or the course of management of these patients. There was one required intervention due to a blocked drain, which required drainage of a collection. We have not analysed the number of days in the hospital, there was no difference between the two groups with POPF and another group. The hospital stays varied mainly due to patient's social circumstances.

A commonly observed problem in P-J is that sutures cut through the pancreatic tissue thus leading to dehiscence in the anastomosis, especially in soft pancreatic parenchyma. Therefore an adequate part of the pancreatic duct which is much stronger must get incorporated into the anastomosis. This practice is one of the main essences of this technique. The interrupted sutures are well placed before any of the stitches are tied enabling a good visualization of each stitch making sure that an adequate amount of ductal tissue is incorporated into the anastomosis. The long parenchyma traversing stitch with the duct will snug the stitches well to the jejunum, thus making the anastomosis watertight.

One of the advantages of this technique is that it uses a lesser number of stitches in an interrupted single layer fashion. The usage of a higher number of stitches causes more trauma to the parenchyma thus inducing more inflammation and oedema. Therefore, the lesser number of stitches, usually about 6-8, should minimize the inflammation (16). Besides, the extra number of stitches makes it more ischaemic and will affect healing. With this technique, we were able to overcome or minimize that issue.

The major component of the effluent or output from P-J anastomotic leak usually results from the jejunal side. Especially in a pancreatic dump, if there is dehiscence in the anastomosis the output from the fistula will be quite high. Combination of high output and digestive pancreatic enzymes will adversely affect the POPF healing. In this new technique, the jejunal side will only have a puncture wound which is around 3-5 mm which has the advantage of early closure even if there is a leak. The silastin trans-anastomotic stent will also aid the healing by maintaining the continuity of the pancreatic duct and the jejunum and also acting as a bridge across the anastomosis.
In conclusion, the advantage of this new technique is that it can be safely used in varying consistencies of the gland and varying sizes of the pancreatic duct. Therefore we recommend this technique as a safe and relatively easy procedure with minimal POPF rate.

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

References