

# Post-Operative Outcomes Comparing Different Techniques of Stump Closure after Distal Pancreatectomy Post-Operative Complications in Stump Closure

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**Abstract:- Introduction:** Distal pancreatectomy (DP) is a preferred therapy for pancreatic disorders that affect just the body and tail of the pancreas and do not include the head. Various methods are in practice for the stump closure after PD. The current study assesses the comparison of the autologous patch, hand sutured, and staple in terms of postoperative complications and hospital stays in stump closure after DP. **Method:** A prospective study was conducted in patients who underwent stump closure after DP between August 2017 and March 2022 at Hayatabad Medical Complex, Peshawar, Pakistan. After giving informed consent, the patient was divided into three groups, including the autologous patch group (APG), hand sutured group (HSG), and stapled group (SG). The outcome of the current study was operation time, intraoperative bleeding, POPF, and hospital stay. The statistical analysis was carried out using SPSS v25. **Results:** The mean operation time was observed lowest in the APG while highest in the SG. In the SG, most of the patients were fell in ASA grade ranged from I to III, while most of the APG patients were fell in ASA grade I. The patients with grade C POPF was high in the HSG, whereas the grade B POPF was high in the SG. Based on CDC, the grade V postoperative complications were high in the HSG and SG. The hospital stay was observed less in patients who underwent autologous patch surgery compared to HSG and SG. **Conclusion:** The current study highlighted that an autologous patch was superior to hand-sewn stump closure after DP in terms of the operation time, POPF, postoperative complications based on CDC, and hospital stay. Whereas the patients presented almost the same postoperative complications who underwent autologous patch and stapled stump closure.

**Keywords:-** Distal pancreatectomy, stump closure, postoperative complications.

## I. INTRODUCTION

Distal pancreatectomy (DP) is a preferred therapy for pancreatic disorders that affect just the body and tail of the pancreas and do not include the head. Surgery is indicated for benign as well as malignant diseases. In most studies, recent advances in surgery and enhanced pre and perioperative care resulted in a 2% decrease in mortality associated with DP [1, 2]. However, there was no significant decrease in associated morbidity. It may be due to the development of postoperative pancreatic fistula (POPF), which significantly contributes to the increased morbidity. Post-surgery, the pancreatic juice is continuously produced and excreted from the remnant of the pancreatic tissue. If the closure fails to seal the ducts or the residual surface, the pancreatic secretions will lyse the surrounding tissues, resulting in intra-abdominal fluid collections, abscesses, or abdominal bleeding and fistulas. Multiple approaches have been proposed to prevent fistula development; however, POPF is still challenging for surgeons [2-6].

So far, six different procedures have been documented to be used for stump closure after DP. These include hand sutures on the stump to close the draining pancreatic duct, stapler-based transection, and concomitant stump closure, and a combination of stapler-based resection with manual sutures along the stapler line, pancreatico-enteric or -gastric anastomosis, application of fibrin/coagulation factor-like bio-sealants, and placement of autologous. In addition to these procedures, laparoscopic DP is a new technological feature but still facing with a POPF [7-10]. Furthermore, there is a broad range of PF rates following DP, ranging from 12% to 51%, as well as significant variances in stump closure procedures used in different pancreatic centers throughout the globe [7, 11].

The incidence of POPF after DP remains high, and different pancreatic stump closure techniques have been used to lower the prevalence. Moreover, many techniques have been proposed for managing the pancreatic remnant to reduce the incidence of PF after DP. Stapler closure and hand-sewn closure of the pancreatic stump are the standard methods described in the literature [12-14]. Several other

strategies, such as bipolar scissors, fibrin glue sealant, omental plug, falciform ligament patch, saline-linked radiofrequency ablation and pancreatojejunostomy of the pancreatic stump, have also been described [15-17]. However, none of the current stump closure techniques have proven satisfactory for all patients [18-20]. The current study assesses the comparison of the autologous patch, hand sutured, and staple in terms of postoperative complications and hospital stays in stump closure after DP.

**II. METHOD**

*A. Patients*

A prospective study was conducted in patients who underwent stump closure after DP between August 2017 and March 2022 at Hayatabad Medical Complex, Peshawar, Pakistan. All patients were included in the study who underwent autologous patch, hand sutured, and stapled for stump closure after DP. After giving informed consent, the patient was divided into three groups, including the autologous patch group (APG), hand sutured group (HSG), and stapled group (SG). These patients were prospectively followed for postoperative complications and hospital stay. A tube drain was inserted at the pancreatic cut surface or anastomosis. Amylase levels in the drainage fluid were monitored on days 5 and 7, and then twice weekly for the next two weeks in patients who developed a fistula. The drain was withdrawn on days 3 and 5 and removed on day 7 in the normal case. Before discharge, all patients had postoperative ultrasonography (US) and/or computed tomography (CT).

*B. Outcomes*

The outcome of the current study was operation time, intraoperative bleeding, POPF, and hospital stay. The POPF was graded according to the International Study Group on Pancreatic Fistulas (ISGPF). The severity is graded from A (least severe) through C (most severe). The clinical state, therapy used, imaging study findings, delayed drainage, reoperation, mortality, infection symptoms, and re-admission were used to grade POPF. The postoperative complication was assessed using Clavien-Dindo classification (CDC). Based on this classification, the postoperative complication was divided into five grades ranging from no complications (Grade I) to severe complications, which lead to death (Grade V).

*C. Statistical analysis*

The statistical analysis was performed using a statistical package for social sciences (SPSS v25). The categorical variables were tabulated as frequency and percentage, while the scale variables were presented as mean and standard deviation. Statistical differences between the subgroups were assessed using the Kruskal-Wallis and Chi-square tests, whereas the independent t-test and One-way ANOVA test were used where the dependent variable was scale. The P-value was statistically significant at a 0.05 level.

**III. RESULT**

In the current study, there was a significant difference among the surgery group in terms of age (p=0.007). The mean operation time of the was observed lowest in the APG while highest in the SG (215.0±5.57 vs 240.13±4.55, p<0.0001). the detail can be seen in Table 1.

|                                 |        | Group         |               |               | P-value |
|---------------------------------|--------|---------------|---------------|---------------|---------|
|                                 |        | APG           | HSG           | SG            |         |
|                                 |        | mean±SD/n (%) | mean±SD/n (%) | mean±SD/n (%) |         |
| Age (years)                     |        | 41.80±4.32    | 44.71±2.21    | 44.50±2.00    | 0.007   |
| Gender                          | Male   | 7 (29.2)      | 9 (37.5)      | 8 (33.3)      | 0.58    |
|                                 | Female | 4(21.1)       | 6 (31.6)      | 9 (47.4)      |         |
| Duration of operation (min)     |        | 215.0±5.57    | 225.57±7.72   | 240.13±4.55   | <0.0001 |
| Intra-operative blood loss (ml) |        | 346.20±8.07   | 350.86±10.5   | 342.75±8.92   | 0.196   |

Table 1: Patient Characteristics And Peri-Operative Status Of Surgeries

Autologous patch group (APG), Hand sutured group (HSG), Stapled group (SG.)

In the SG, most of the patients were fell in ASA grade ranged from I to III, while most of the APG patients were fell in ASA grade I (Figure 1A). The patients with grade C POPF was high in the HSG, whereas the grade B POPF was high in the SG (Figure 1B). Based on CDC, the grade V postoperative complications were high in the HSG and SG (Figure 1C). The hospital stay was observed less in patients who underwent autologous patch surgery compared to HSG and SG (Figure 1D).

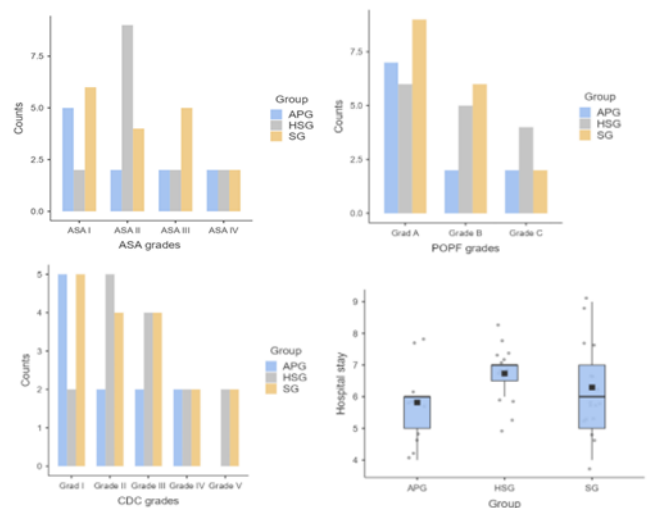


Fig. 1: Comparison of the Outcome Variables

#### IV. DISCUSSION

The current study highlighted that an autologous patch was superior to hand-sewn stump closure after DP in terms of the operation time, POPF, postoperative complications based on CDC, and hospital stay. Whereas the patients presented almost the same postoperative complications, who underwent autologous patch and stapled stump closure.

One of the most common causes of postoperative complications is pancreatic leak [21]. It has been reported that pancreatic leak occurs in 30% of patients. This is a greater rate than pancreaticoduodenectomy. The current study shows POPF is the most common surgical complication and has been reported that it is linked with pancreatic leak [8]. However, depending on the grade, the POPF can be managed. Notably, 70% of pancreatic fistulas resolved spontaneously [8]. However, the best therapeutic strategy is still up for debate. The rate of grade C pancreatic fistula requiring a re-exploration range from 5 to 20%, with a mortality rate of 39% [22]. The pancreatic fistula is currently managed by pancreatic remnant preservation and a complete pancreatectomy [23]. Although pancreatectomy prevents additional PF, it is associated with total pancreatic insufficiency, which leads to brittle diabetes. The preservation strategy is technically simpler and has the added benefit of preserving pancreatic function. However, it increases the risk of persistent pancreatic hemorrhage. Furthermore, there is experience with other treatments, such as pancreaticogastrostomy conversion and the bridging stent procedure. Moreover, there is no proof that drainage of the pancreatic duct with a stent can reduce PF rate following PD [24]. Finally, there is the practice of resectioning a dehiscence jejunal loop and pancreatic drainage, followed by gastrofistulostomy [25].

Patients who have complications following pancreatic surgery have three times the cost of those who do not have complications. It is worth noting that PF type C is one of the most severe postoperative surgical complications. These patients' hospital stays are substantially longer than those of patients who do not have PF [26]. A median total cost of the treatment depends on the type of PF: A, B, and C—100%, 170%, and 620%, respectively. There is no significant difference in total cost between patients without PF and with PF type A. One retrospective cohort study has shown that dedicated oversewing of the main pancreatic duct reduces the rates of POPF (9.6% vs 34.0%,  $p < 0.001$ ). However, such a result was probably obtained due to a more accurate identification of the pancreatic duct in tougher and more fibrotic pancreas, which is associated with a decreased risk of POPF. The placement of a jejunal seromuscular patch to the DP staple line has also been studied, with no difference in POPF rates. Drainage of the remaining stump via a pancreatoenteric anastomosis was also investigated, but no significant difference in POPF rates was seen [27].

Various ancillary methods have been described to reinforce stump closure of the remnant pancreas after DP. This includes the use of staple line reinforcement with an

absorbable mesh. Several small sample size prospective trials and retrospective cohort studies have demonstrated some reduction in POPF with its use [28]. However, a multicenter RCT of 275 patients evaluating the use of an absorbable fibrin sealant patch (TachoSil) revealed no significant reduction in grade B or C POPF with its use in patients undergoing DP (TachoSil 8% vs no TachoSil 14%,  $p = 0.139$ ) [29]. Various glues have also been evaluated, with most studies showing no reduction in the rates of POPF. Such glues include cyanoacrylate formulations and fibrin glues [30].

#### V. CONCLUSION

The current study highlighted that an autologous patch was superior to hand-sewn stump closure after DP in terms of the operation time, POPF, postoperative complications based on CDC, and hospital stay. Whereas the patients presented almost the same postoperative complications who underwent autologous patch and stapled stump closure.

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