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## Introduction & Aim

- A pancreatic pseudocyst (PP) is a collection of fluid surrounded by a well-defined wall that contains no solid material often arising in the context of acute or chronic pancreatitis or complicating pancreatic trauma postoperatively or post-injury
- Aim:** Take a population based approach to evaluate differences in inpatient outcomes among open surgical, laparoscopic, percutaneous, and endoscopic drainage for PP.

## Methods

### Data & Cohort

- 2017 National Inpatient Sample (NIS)
- Adults with a diagnosis of PP with a single drainage approach [ICD-10 codes]

### Baseline Characteristics Observed / Covariates

- Patient Demographics: Age, Race, Sex, Income, Payer
- Hospital Characteristics: Teaching Status, Size, Region,
- Clinical Features: Elixhauser Comorbidities, Admission Status
- Assessed with Rao-Scott Chi-Squared and Mann-Whitney tests
- Type of drainage performed
- Type of pancreatitis (acute, chronic, acute on chronic)

### Outcomes Assessment

- Primary Outcomes: Length of stay (LOS), Total In-hospital charges, routine vs non-routine disposition, mortality
- Secondary Outcomes: post-operative complications and procedures performed
- Assessed with adjusted multivariable negative binomial, gamma log-link, and logistic regression
- Controlled for baseline characteristic differences

## Results

**Table 1 Adjusted Multiple Regression of Outcomes versus Drainage Method**

|                            | Coefficient | 95% Confidence Interval | P Value |
|----------------------------|-------------|-------------------------|---------|
| <b>Total Charge</b>        |             |                         |         |
| Open Surgical              | Ref         | Ref                     | Ref     |
| Percutaneous               | 0.83        | (0.69 - 0.99)           | 0.04 *  |
| Laparoscopic               | 0.74        | (0.62 - 0.89)           | 0.001 * |
| Endoscopic                 | 0.72        | (0.56 - 0.93)           | 0.01 *  |
| <b>Length of Stay</b>      |             |                         |         |
| Open Surgical              | Ref         | Ref                     | Ref     |
| Percutaneous               | 0.96        | (0.82 - 1.14)           | 0.67    |
| Laparoscopic               | 0.78        | (0.64 - 0.95)           | 0.01 *  |
| Endoscopic                 | 0.70        | (0.55 - 0.9)            | 0.01 *  |
| <b>Mortality</b>           |             |                         |         |
| Open Surgical              | Ref         | Ref                     | Ref     |
| Percutaneous               | 4.40        | (0.32 - 61.38)          | 0.27    |
| Laparoscopic               | 2.76        | (0.18 - 42.09)          | 0.47    |
| Endoscopic                 | 4.46        | (0.19 - 102.72)         | 0.35    |
| <b>Routine Disposition</b> |             |                         |         |
| Open Surgical              | Ref         | Ref                     | Ref     |
| Percutaneous               | 0.57        | (0.32 - 1)              | 0.049 * |
| Laparoscopic               | 1.54        | (0.83 - 2.82)           | 0.17    |
| Endoscopic                 | 1.50        | (0.69 - 3.26)           | 0.31    |

\*P < 0.05

**Table 2 Multiple logistic regression of complications**

| Complication                 | Method <sup>1</sup> | Odds Ratio | 95% Conf Int   | P Value |
|------------------------------|---------------------|------------|----------------|---------|
| Acute DVT                    | Percutaneous        | 0.33       | (0.08 - 1.39)  | 0.13    |
|                              | Laparoscopic        | 0.29       | (0.06 - 1.45)  | 0.13    |
|                              | Endoscopic          | 0.26       | (0.04 - 1.78)  | 0.17    |
| Acute Posthemorrhagic Anemia | Percutaneous        | 0.48       | (0.21 - 1.08)  | 0.08    |
|                              | Laparoscopic        | 0.36       | (0.16 - 0.8)   | 0.01 *  |
|                              | Endoscopic          | 0.06       | (0.01 - 0.5)   | 0.01 *  |
| Acute Renal Failure          | Percutaneous        | 1.78       | (0.9 - 3.52)   | 0.10    |
|                              | Laparoscopic        | 1.21       | (0.58 - 2.53)  | 0.61    |
|                              | Endoscopic          | 0.78       | (0.26 - 2.36)  | 0.65    |
| Mechanical Ventillation      | Percutaneous        | 2.00       | (0.69 - 5.78)  | 0.20    |
|                              | Laparoscopic        | 1.01       | (0.33 - 3.1)   | 0.99    |
|                              | Endoscopic          | 1.19       | (0.29 - 4.88)  | 0.81    |
| Pneumonia                    | Percutaneous        | 4.26       | (1.08 - 16.86) | 0.04 *  |
|                              | Laparoscopic        | 1.96       | (0.46 - 8.34)  | 0.36    |
|                              | Endoscopic          | 2.10       | (0.36 - 12.27) | 0.41    |
| Sepsis                       | Percutaneous        | 2.05       | (1.09 - 3.85)  | 0.03 *  |
|                              | Laparoscopic        | 1.25       | (0.67 - 2.34)  | 0.48    |
|                              | Endoscopic          | 1.62       | (0.7 - 3.73)   | 0.26    |
| Tranfusion of RBC            | Percutaneous        | 0.63       | (0.28 - 1.46)  | 0.28    |
|                              | Laparoscopic        | 0.39       | (0.16 - 0.99)  | 0.049 * |
|                              | Endoscopic          | 0.28       | (0.08 - 1.05)  | 0.06    |

<sup>1</sup> Open surgical set as the reference group for all complication regressions

DVT: Deep Vein Thrombosis

RBC: Red blood cells

\* P < 0.05

## Results

- 35,555 weighted PP cases; 3720 underwent drainage via a single procedure
- Endoscopic drainage (aRR:0.7, 95% CI 0.55-0.9, p=0.01) and laparoscopic drainage (aRR:0.78, 95%CI 0.64 - 0.95, p=0.01) were associated with shorter LOS
- Endoscopic drainage was associated with the lowest total charge (-28%, p=0.01) followed by laparoscopic (-25.9%, p=0.001) and percutaneous (-17.4%, p=0.04)
- Percutaneous drainage was associated with a lower likelihood of routine disposition (aOR: 0.56, 95% CI 0.32 - 1, p=0.05)
- Endoscopic (aOR:0.06, 95% CI 0.01-0.5, p=0.01) and laparoscopic (aOR:0.36, 95% CI 0.16 - 0.8, p=0.01) drainage had lower rates of acute post hemorrhagic anemia
- Laparoscopic drainage was associated with lower rates of red blood cell transfusion (aOR: 0.39, 95% CI 0.16-0.99, p=0.05). Percutaneous drainage was associated with higher rates of sepsis (aOR: 2.05, 95% CI 1.09 - 3.85, p=0.03) and pneumonia (aOR: 4.26, 95% CI 1.08 - 16.86, p=0.04)

## Conclusion

- Endoscopic and laparoscopic PP drainage are associated with the least short term procedure related complications
- More favorable outcomes compared to open surgical and percutaneous approaches
- Percutaneous and open surgical drainage associated with longer LOS and lower rates of routine disposition
- Further studies are needed to assess long-term outcomes of different modalities and determine optimal drainage technique in relation to PP characteristics and location.

