ORIGINAL ARTICLE

# Moving towards the New International Study Group for Pancreatic Surgery (ISGPS) definitions in pancreaticoduodenectomy: a comparison between the old and new

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## Abstract

**Background:** The International Study Group for Pancreatic Surgery (ISGPS) has proposed several definitions for postoperative pancreatic fistula (POPF), delayed gastric emptying (DGE) and post-pancreatectomy haemorrhage (PPH). We assessed the effects of implementing these definitions on predicting outcomes.

**Methods:** A database of 77 patients who underwent pancreaticoduodenectomy between January 2005 and December 2009 was analysed. Morbidities were defined and classified using the ISGPS definitions and recalculated based on the definitions adopted by our institution ('Old' definitions) prior to the implementation of ISGPS definitions. Data for the two groups were then compared.

**Results:** The morbidity rate rose to 70.1% from 27.2% when ISGPS rather than Old definitions were used to define morbidities ($P < 0.001$). Incidences of DGE, POPF and PPH were 20.7%, 39.0% and 10.4%, respectively. Rates of DGE and POPF were significantly higher according to ISGPS definitions than to Old definitions (20.7% vs. 5.2% [$P = 0.001$] and 39.0% vs. 15.6% [$P = 0.004$], respectively). According to the ISGPS definitions, all of the 12 additional patients with DGE and 12 of the 18 additional patients with POPF had grade A morbidities. Patients with ISGPS-defined morbidity had a longer intensive care unit (ICU) stay, longer postoperative stay and longer total stay ($P = 0.030$, $P = 0.007$ and $P = 0.001$, respectively).

**Conclusions:** The morbidity rate more than doubled when ISGPS definitions were applied (an additional 42.9% of patients demonstrated morbidities). The majority of patients with DGE and POPF had grade A morbidities. The ISGPS definitions correlate well with ICU stay, postoperative stay and total length of stay.

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## Introduction

Over the last three decades, many centres have reported improved mortality rates in pancreaticoduodenectomy (PD), but morbidity rates remain high.[1–14] The wide variation in definitions for the various complications that may occur following pancreatic surgery has made comparison across different institutions difficult.[1,15–34] The International Study Group for Pancreatic Surgery (ISGPS) has proposed definitions and classifications for the common morbidities that occur after pancreatic surgery, namely, postoperative pan-creatic fistula (POPF), delayed gastric emptying (DGE) and post-pancreatectomy haemorrhage (PPH).[15,35,36] The aim of this study was to assess the effects on predicting outcomes of implementing the ISGPS definitions compared with the classification system used in this institution previously.

## Materials and methods

A prospective database of all patients who underwent PD in our institution between January 2005 and December 2009 was

**Table 1** International Study Group for Pancreatic Surgery grading of delayed gastric emptying after pancreatic surgery

| DGE grade | NGT required | Unable to tolerate solid oral intake at: | Vomiting/gastric distension | Use of prokinetics |
|---|---|---|---|---|
| A | 4–7 days or reinsertion after PoD 3 | PoD 7 | Yes/no | Yes/no |
| B | 8–14 days or reinsertion after PoD 7 | PoD 14 | Yes | Yes |
| C | >14 days or reinsertion after PoD 14 | PoD 21 | Yes | Yes |

DGE, delayed gastric emptying; NGT, nasogastric tube; PoD, postoperative day.
To exclude mechanical causes of abnormal gastric emptying, the patency of either the gastrojejunostomy or the duodenojejunostomy should be confirmed by endoscopy or upper gastrointestinal gastrographin series.
Adopted from Wente *et al*.[15]

analysed retrospectively. The new ISGPS guidelines to define and classify postoperative morbidities in pancreatic surgery were adopted in early 2006. Morbidity rates in the same cohort of patients were then recalculated using the systems of classifying DGE, POPF and PPH that had been in use locally prior to the implementation of the ISGPS definitions ('Old' definitions). Patients defined as having suffered morbidity by either classification were then identified. Outcomes measured were postoperative intensive care unit (ICU) stay, high-dependency unit (HDU) stay, length of hospital stay (LoS) and total length of stay (the sum of the stay from initial admission and any readmissions within 30 days of discharge). The two systems of classification were then compared to assess if the ISGPS definitions related to LoS parameters better than the definitions used in the previous classification system.

Data were analysed using SPSS Version 15.0 (SPSS, Inc., Chicago, IL, USA) and STATA Version 9.2 (StataCorp LP, College Station, TX, USA). Statistical significance was assumed at a *P*-value of <0.05. McNemar's test was used to cross-tabulate nominal data and the Mann–Whitney test was used for non-parametric continuous parameters.

The preoperative selection and workup of patients undergoing PD have been described previously.[37] Operative techniques for PD, including the classical Whipple procedure and pylorus-preserving PD have been reported previously.[38] The choice of the type of pancreatic-enteric anastomosis is based on the surgeon's preference. In general, hepatopancreatobiliary (HPB) surgeons choose to perform pancreaticojejunostomy (PJ), whereas upper gastrointestinal tract (UGI) surgeons prefer pancreaticogastrostomy.

A standard pancreatic surgery care pathway for postoperative management in the wards was applied since 2005. Surgery was performed by one of five surgeons (three HPB and two UGI surgeons) during the study period. A single dose of 200 mcg of subcutaneous sandostatin was administered during pancreatic transaction. Subcutaneous sandostatin was then continued for 1 week postoperatively at a dose established by the consistency of the pancreatic tissue as assessed during surgery. If the pancreas was soft or the pancreatic duct measured < 3 mm, 200 mcg was administered at 8-h intervals; otherwise 100 mcg was administered at 8-h intervals.[39] In the immediate postoperative period, patients were maintained on a nil-by-mouth regime in which a

nasogastric tube (NGT) was used to facilitate passive drainage and aspiration at 4-h intervals. Patients were allowed non-milk feeds if their nasogastric output was < 100 ml on postoperative day (PoD) 1 and the NGT was removed on PoD 2 if output remained at < 100 ml. Feeding was graduated as tolerated. In general, by PoD 3 or 4, patients had started on a solid diet.

All complications were documented clearly and graded according to the ISGPS grading system when applicable (Tables 1–3). The specific complications examined include DGE, POPF and PPH.

Grade A DGE does not lead to any marked change in management other than for minor disturbances that occur during the return to intake of solid food.[15] Grade A POPF has no clinical impact and requires little change in management or deviation from the normal clinical pathway.[36] For the purposes of this study, grade A DGE and POPF are therefore referred to as clinically insignificant morbidities.

Prior to the definitions proposed by the ISGPS, morbidities were defined according to a different system of classification. This is compared with the ISGPS definitions in Table 4.

Perioperative mortality was defined as in-hospital death or death within 30 days of surgery.

## Results
### Demography
A total of 77 patients underwent PD during the study period, 40 of whom were male. Demographics, comorbidities and histology data are shown in Table 5.

Overall, 46 patients (59.7%) underwent a pylorus-preserving PD and the rest underwent a classical Whipple procedure. Pancreaticojejunostomy anastomosis was performed in 63 (81.8%) patients and pancreaticogastrostomy was carried out in the rest. The median duration of surgery was 580 min (range: 245–945 min). Median estimated blood loss was 1000 ml (range: 300–6000 ml). The median quantity of blood transfused was 2 units (range: 1–4 units).

Median postoperative stay and total LoS were 10 days (range: 5–137 days) and 15 days (range: 5–150 days), respectively. Median ICU stay was 1 day (range: 0–28 days) and median HDU stay was 3 days (range: 0–12 days). One patient had a long ICU stay of 28