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Short Report

Routine abdominal drainage after distal pancreatectomy: meta-analysis

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Introduction

The incidence of postoperative pancreatic fistula (POPF) and morbidity after distal pancreatectomy (DP) is high[1–6]. Routine abdominal drainage aims to protect against severe consequences of POPF[7], but the evidence for routine abdominal drainage after DP is unclear.

Most studies of drain management combined DP with pancreatoduodenectomy, and are therefore less useful[8–12]. Drain placement may lead to retrograde infection, patient discomfort, or direct damage to blood vessels[13]. A recent multicentre randomized trial[6] demonstrated comparable outcomes with and without routine abdominal drainage after DP. It is unclear, however, whether omitting routine drainage in subgroups with a high risk of POPF would potentially lead to an increased risk of complications.

A systematic review of abdominal drainage after DP specifically is lacking. In this systematic review, the benefits and risks associated with a no-drain strategy *versus* abdominal drainage after DP were compared.

Methods

A systematic review and meta-analysis was undertaken to compare no drain placement versus routine abdominal drainage in patients undergoing DP. The primary outcome was major morbidity, defined as complications with a Clavien–Dindo grade of III or higher. Secondary outcomes were POPF (International Study Group of Pancreatic Surgery (ISGPS) grade B/C, 2016)[1], delayed gastric emptying (ISGPS grade B/C), postpancreatectomy haemorrhage (ISGPS grade B/C), radiological intervention, readmission, ICU admission, reoperation, and 30-day mortality. Meta-analysis was performed using Review Manager (RevMan) version 5.0 (The Cochrane Collaboration, Hamilton, Canada); details are available in *Appendix S1*.

Results

The search identified 2176 studies, of which five[6,14–17] were included involving 2153 patients, all of whom were included in the meta-analysis. The detailed search process is shown in *Appendix S2* and *Fig. S1*. *Tables S1* and *S2* show study characteristics, baseline characteristics, operative parameters, and outcome measures in each included study. Definitions in each study are detailed in *Table S3*. None of the included studies incorporated a subgroup analysis based on low or high POPF risk. Differences in (pre)operative and postoperative management are summarized in *Table S4*. Risk-of-bias assessment can be found in *Appendix S3*, *Fig. S2*, and *Tables S3–S7*.

Meta-analysis

All five studies[6,14–17] included data on the primary outcome, major morbidity, which was found to be lower in the no-drain

Table 1 Summary of findings for no drain *versus* drain

Outcome	No. of studies	No. of patients	Statistical model	Risk ratio	Quality (GRADE)
Major morbidity	5	2153	M-H, fixed effect	0.55 (0.42, 0.72)	Moderate ⊕⊕⊕⊖
POPF grade B/C	5	2153	M-H, fixed effect	0.82 (0.68, 0.99)	High ⊕⊕⊕⊕
Radiological intervention	5	2153	M-H, fixed effect	0.85 (0.65, 1.10)	Moderate ⊕⊕⊕⊖
Reoperation	5	2153	M-H, fixed effect	0.93 (0.57, 1.51)	Moderate ⊕⊕⊕⊖
Readmission	3	1852	M-H, fixed effect	0.76 (0.60, 0.96)	Moderate ⊕⊕⊕⊖
Alive at 30 days	5	2153	M-H, fixed effect	1.00 (1.00, 1.01)	Moderate ⊕⊕⊕⊖
Postpancreatectomy haemorrhage	2	1502	M-H, fixed effect	0.98 (0.45, 2.15)	Moderate ⊕⊕⊕⊖
Surgical-site infection	1	232	M-H, fixed effect	1.86 (0.77, 4.49)	Low ⊕⊕⊖⊖
Intra-abdominal abscess	2	413	M-H, fixed effect	0.93 (0.53, 1.61)	Moderate ⊕⊕⊕⊖

Values in parentheses are 95 per cent confidence intervals. GRADE, Grading of Recommendations Assessment, Development and Evaluation with possible scores: very low: ⊕⊖⊖⊖, low: ⊕⊕⊖⊖, moderate: ⊕⊕⊕⊖ and high: ⊕⊕⊕⊕. M-H, Mantel–Haenszel; POPF, postoperative pancreatic fistula.

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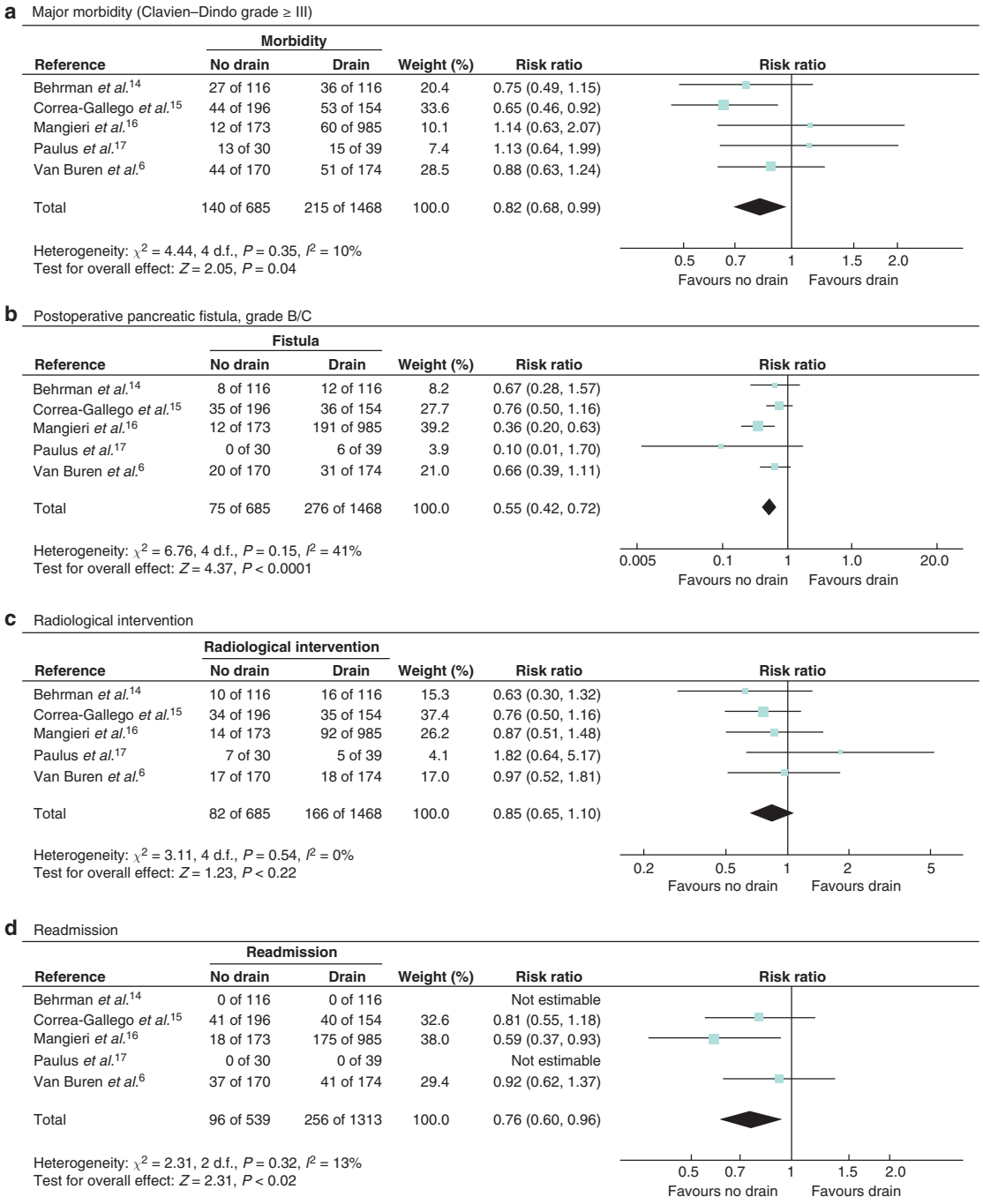

Fig. 1 Meta-analysis of impact of no drain *versus* drain on outcomes after distal pancreatectomy

a Major morbidity, **b** grade B/C postoperative pancreatic fistula, **c** radiological intervention, and **d** readmission. A Mantel–Haenszel fixed-effect model was used for meta-analysis. Risk ratios are shown with 95 per cent confidence intervals.

compared with the drain group (risk ratio (RR) 0.82, 95 per cent c.i. 0.68 to 0.99) (*Table 1* and *Fig. 1*). There was no heterogeneity in the primary outcome between the studies.

All five studies[6,14–17] reported data on POPF grade B/C. Pooled analysis showed that the POPF rate was lower in the no-drain group compared with the drain group (RR 0.55, 0.42 to 0.72). Readmissions were reported in three studies[1,16,17], with a lower rate in the no-drain group (RR 0.76, 0.60 to 0.96).

Rates of radiological intervention, postpancreatectomy haemorrhage, delayed gastric emptying, intra-abdominal abscess, surgical-site infection, reoperation, and 30-day mortality were no different between groups. Detailed results of the meta-analysis are shown in *Appendix S4*, *Table 1*, and *Fig. 1*.

Discussion

No drain placement after DP was associated with a lower rate of major complications (Clavien–Dindo grade at least III), POPF, and readmissions. Rates of radiological intervention and reoperation did not differ. No study has reported on high-risk subgroups.

A few studies concluded that omitting drains after DP was safe, potentially because most of them analysed a combination of

pancreatoduodenectomy and DP. POPF after pancreatoduodenectomy is different as there is, by definition, an infection owing to underlying anastomotic dehiscence. This cannot be compared with the situation after DP[8–11].

Five studies were included in the present meta-analysis, which has a high statistical power and effect size by including a large number of patients. In the study by Paulus and colleagues[17] the no-drain group had a lower rate of POPF (0 *versus* 15 per cent), without differences in other complications. The discrepancy between POPF and other complications in the no-drain group can be explained by use of the older terminology for POPF, which has been updated since then. This why severe morbidity was chosen as primary endpoint in the present study. Mangieri *et al.*[16] reported a higher rate of POPF grade B/C and readmissions in the drain group. Behrman and co-workers[14] reported no difference between groups in severe morbidity and grade B/C POPF. Correa-Gallego and colleagues also did not find any disadvantages in the no-drain group[15]. The only included randomized multicentre trial, by Van Buren *et al.*, did not find a difference in rate of POPF, but noted comparable rates of radiological intervention between the groups[5]. This trial did not stratify by subgroups such as high- and low-risk POPF. It therefore remains unclear whether the outcomes reported in the present meta-analysis also apply to high-risk subgroups. This meta-analysis has confirmed the findings of Van Buren that a routine drain policy does not protect the patient from additional radiological interventions.

Recently, the first distal fistula risk score was constructed, which includes duct size and pancreatic thickness (M. v. B. E. De Pastena, submitted for publication). This prediction model enables the clinician to determine the risk of POPF, so that appropriate measures can be taken, such as selective drainage in high-risk patients. Future pragmatic multicentre randomized trials including risk-stratified randomization are required before final conclusions can be drawn.

This study had several limitations. Non-randomized studies could have been exposed to selection bias, information bias, and follow-up bias because patients who did not receive drains may have had favourable characteristics leading to omission of drains. The definition of POPF differed between studies. Potential bias was minimized by analysing only POPF grade B/C according to the ISPGS[1]. There was heterogeneity between studies. In most studies, however, no clinically relevant differences were observed between preoperative, perioperative, and postoperative parameters in the two groups, such as stump closure methods. Different stump closure methods could lead to a difference in POPF rate[18].

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Disclosure. The authors declare no conflict of interest.

Supplementary material

Supplementary material is available at *BJS* online.

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European Colorectal Congress

28 November – 1 December 2022, St.Gallen, Switzerland

Monday, 28 November 2022

09.50
Opening and welcome
Jochen Lange, St.Gallen, CH

10.00
It is leaking! Approaches to salvaging an anastomosis
Willem Bemelman, Amsterdam, NL

10.30
Predictive and diagnostic markers of anastomotic leak
Andre D'Hoore, Leuven, BE

11.00
SATELLITE SYMPOSIUM
ETHICON

11.45
Of microbes and men – the unspoken story of anastomotic leakage
James Kinross, London, UK

12.15
LUNCH

13.45
Operative techniques to reduce anastomotic recurrence in Crohn's disease
Laura Hancock, Manchester, UK

14.15
Innovative approaches in the treatment of complex Crohn Diseases perianal fistula
Christianne Buskens, Amsterdam, NL

14.45
To divert or not to divert in Crohn surgery – technical aspects and patient factors
Pär Myrelid, Linköping, SE

15.15
COFFEE BREAK

15.45
Appendiceal neoplasia – when to opt for a minimal approach, when and how to go for a maximal treatment
Tom Cecil, Basingstoke, Hampshire, UK

16.15
SATELLITE SYMPOSIUM
Medtronic
Further,Together

17.00
Outcomes of modern induction therapies and Wait and Watch strategies, Hope or Hype
Antonino Spinelli, Milano, IT

17.30
EAES Presidential Lecture - Use of ICG in colorectal surgery: beyond bowel perfusion
Salvador Morales-Conde, Sevilla, ES

18.00
Get-Together with your colleagues
Industrial Exhibition

Tuesday, 29 November 2022

9.00
CONSULTANT'S CORNER
Michel Adamina, Winterthur, CH

10.30
COFFEE BREAK

11.00
SATELLITE SYMPOSIUM
INTUITIVE

11.45
Trends in colorectal oncology and clinical insights for the near future
Rob Glynne-Jones, London, UK

12.15
LUNCH

13.45
VIDEO SESSION

14.15
SATELLITE SYMPOSIUM
BD

15.00
COFFEE BREAK

15.30
The unsolved issue of TME: open, robotic, transanal, or laparoscopic – shining light on evidence and practice
Des Winter, Dublin, IE
Jim Khan, London, UK
Brendan Moran, Basingstoke, UK

16.30
SATELLITE SYMPOSIUM
Takeda

17.15
Lars Pahlman lecture
Søren Laurberg, Aarhus, DK

Thursday, 1 December 2022
Masterclass in Colorectal Surgery
Proctology Day

Wednesday, 30 November 2022

9.00
Advanced risk stratification in colorectal cancer – choosing wisely surgery and adjuvant therapy
Philip Quirke, Leeds, UK

09.30
Predictors for Postoperative Complications and Mortality
Ronan O'Connell, Dublin, IE

10.00
Segmental colectomy versus extended colectomy for complex cancer
Quentin Denost, Bordeaux, FR

10.30
COFFEE BREAK

11.00
Incidental cancer in polyp - completion surgery or endoscopy treatment alone?
Laura Beyer-Berjot, Marseille, FR

11.30
SATELLITE SYMPOSIUM
EVOLUZIONE DISPOSITIVI MEDICI

12.00
Less is more – pushing the boundaries of full-thickness rectal resection
Xavier Serra-Aracil, Barcelona, ES

12.30
LUNCH

14.00
Management of intestinal neuroendocrine neoplasia
Frédéric Ris, Geneva, CH

14.30
Poster Presentation & Best Poster Award
Michel Adamina, Winterthur, CH

15.00
SATELLITE SYMPOSIUM
OLYMPUS

15.45
COFFEE BREAK

16.15
Reoperative pelvic floor surgery – dealing with perineal hernia, reoperations, and complex reconstructions
Guillaume Meurette, Nantes, FR

16.45
Salvage strategies for rectal neoplasia
Roel Hompes, Amsterdam, NL

17.15
Beyond TME – technique and results of pelvic exenteration and sacrectomy
Paris Tekkis, London, UK

19.30
FESTIVE EVENING

Information & Registration **www.colorectalsurgery.eu**