Pancreatology xxx (2014) 1–6

Contents lists available at ScienceDirect

Pancreatology

journal homepage: www.elsevier.com/locate/pan

Original article

Evidence-based value of prophylactic intraperitoneal drainage following pancreatic resection: A meta-analysis

Yanming Zhou*, Xiaofeng Zhang, Lupeng Wu, Feng Ye, Xu Su, Bin Li

Department of Hepatobiliary & Pancreatovascular Surgery, First Affiliated Hospital of Xiamen University, Oncologic Center of Xiamen, 55 Zhenhai Road, Xiamen 361003, FJ, China

Keywords:
Pancreatic resection
Intraperitoneal drainage
Postoperative complications
Operative outcome
Pancreatic fistula
Meta-analysis

A B S T R A C T

Background and objective: Prophylactic intraperitoneal drainage is usually indwelled after abdominal operation. This study assessed whether prophylactic intraperitoneal drainage was of value after pancreatic resection.

Methods: A systematic literature search was performed to identify relevant articles. Data aggregation and analysis were performed using RevMan 5.0 software package.

Results: A randomized controlled trial and seven observational cohort studies including a total of 2690 patients were eligible. The overall and major complication rates and the occurrence of pancreatic fistula in patients with drainage were higher than those without drainage. Prophylactic intraperitoneal drainage was not associated with a statistically significant reduction in the need for percutaneous drainage, reoperation and readmission, or with an increase in mortality.

Conclusion: The present meta-analysis demonstrated that prophylactic intraperitoneal drainage after pancreatic resection appears to be unable to improve the postoperative course, and may be associated with more severe and higher rate of complication and increased pancreatic fistula occurrence. There is a serious bias in the criteria to insert drain or not in these retrospective studies. Therefore these results should be confirmed by randomized controlled trial.

1. Introduction

With advances in operative techniques and perioperative patient care, the operative mortality after pancreatic resection has declined to less than 5%, while the incidence of postoperative morbidity remains high ranging from 30% to 65% [1]. Pancreatic fistula is the most common and feared postoperative complication that can result in intra-abdominal abscess, postoperative bleeding, multiorgan failure, or even death [2].

Prophylactic intraperitoneal drainage is routinely used following pancreatic surgery. It is thought to drain fluid collections and control potential anastomotic leaks. In addition, drainage may act as a warning sign of leakage or hemorrhage, permitting earlier management and prevention of a severe state [3]. However, the necessity of this practice has been increasingly questioned over the last several decades. In a study involving 22 patients who underwent pancreaticoduodenectomy without drainage in 1992, three patients who developed abdominal abscess were treated without operative drainage [4]. In a retrospective report from the Memorial Sloan-Kettering Cancer Center (MSKCC) in 1998, intra-abdominal drainage did not significantly alter the risk of developing fistula, abscess and reoperation, or the necessity for CT-guided intervention after pancreaticoduodenectomy [5]. In a prospective randomized controlled trial (RCT) in 179 patients conducted by the same institution in 2001, drainage after pancreatic resection did not seem to be associated with a significant reduction in the number of deaths or complications [6]. In a study of 226 consecutive patients who underwent pancreatic resection in 2011, Fisher et al. [7] reported that the occurrence of pancreatic fistula in the drainage group was higher than that in the non-drainage group, while the readmission and postoperative percutaneous drainage rates in the no-drainage group were higher than those in the drainage group. The most recent meta-analysis conducted by van der Wilt et al. [8] compared the above mentioned 3 studies that included 494 patients and found that routine use of abdominal drainage after pancreatic resection was associated with increased

* Corresponding author. Tel.: +86 0592 2139708; fax: +86 0592 2137289.
E-mail address: zhouymsxy@sina.cn (Y. Zhou).

http://dx.doi.org/10.1016/j.pan.2014.04.028

occurrences of major complications, however, the finding did not reach statistical significance ($P = 0.214$) [8]. The result could be biased by the small number of participants enrolled in their study. There is evidence that pooling analysis of small numbers of participants may underestimate the effect, resulting in unreliable outcomes [9]. In addition, pancreatic fistula was not addressed in their meta-analysis. Recently, several studies with more participants are available [10–14]. On this background, we performed an updated evaluation to determine whether prophylactic intraperitoneal drainage was of value after pancreatic resection.

2. Methods

2.1. Study selection and data extraction

The present meta-analysis was performed by following the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Statement [15]. A computerized search was made of the Medline and PubMed from the time of inception to August 2013. The following Mesh search headings were used: "pancreatectomy," "pancreatic resection," "pancreaticoduodenectomy," "drainage," and "drain". Only studies on humans and in the English language were considered for inclusion. Reference lists of all retrieved articles were manually searched for additional studies. Two reviewers (B.L. and Y.Z.) independently extracted the following parameters from each study: first author, year of publication, study population characteristics, study design, inclusion and exclusion criteria, number of subjects in each arm, and outcomes of interest, by using standardized data extraction forms. Agreement between the reviewers for each inclusion criterion was measured by κ with quadratic weighting [16].

2.2. Criteria for inclusion and exclusion

For inclusion in the meta-analysis, a study had to compare cases receiving routine abdominal drainage and those without drainage after pancreatic resections. Abstracts, letters, editorials and expert opinions, reviews without original data, case reports and studies lacking control groups were excluded.

2.3. Quality assessment

As previous reported, RCT was evaluated using the Jadad composite scale and the non-RCT (NRCT) was evaluated using the methodological index for nonrandomized studies (MINORS) [17].

2.4. Outcomes of interest

Outcomes of interest included postoperative overall morbidity, major complication (endoscopic, radiologic or operative intervention required), pancreatic fistula, reoperation, readmission, length of hospital stay (days), and mortality.

2.5. Statistical analysis

Statistical analysis for categorical variables was performed by using estimation of odds ratios (OR) with a 95% confidence interval (95% CI). Heterogeneity between trials was evaluated by χ^2 and I^2, with $P < 0.1$ indicating significant heterogeneity. In the absence of heterogeneity, pooled effect was calculated using the fixed effects model. If the results were heterogeneous, the random-effect model would be undertaken. Publication bias was assessed visually using a funnel plot. All analyses were performed using the Review Manager (RevMan) software, version 5.0 (The Cochrane Collaboration).

The study was approved by the Ethics Committee of our hospital.

3. Results

3.1. Eligible studies

The literature search identified one RCT and seven NRCTs published between 1998 and 2013 that met the eligibility criteria [5–7,10–14]. Three studies were conducted by the same institution in different timeframes without overlap of patients, and therefore all were used [5,6,11]. The eight studies included a total of 2690 patients: 1318 with drainage and 1372 without drainage. Six studies were conducted in the USA [5–7,10,11,13], and the remaining two in France [12,14]. The number of patients in each

Table 1
Study population demographics and intra-operative data of included trials.

Reference (Year)	Country	Group	No. of patients	Age (yr)	Sex (M/F)	Type of procedure	Operating time (min)	Blood loss (ml)	Blood transfusion	Quality score
Heslin et al. [5] (1998)	USA	Drain	51	65 ± 2	32/19	All PD	386 ± 20	1100 ± 10	18	12
		No drain	38	65 ± 2	18/20	All PD	292 ± 13	1100 ± 10	14	
Conlon et al. [6] (2001)	USA	Drain	88	66 (23–81)	46/42	PD:73; DP:15	–	–	–	3[a]
		No drain	91	69 (33–87)	43/48	PD:66; DP:25	–	–	–	
Fisher et al. [7] (2011)	USA	Drain	179	63 (53–72)	78/101	PD:123; DP:56	401 (310–490)	400 (200–700)	34	15
		No drain	47	59 (51–70)	19/28	PD:30; DP:17	400 (314–458)	250 (150–500)	3	
Paulus et al. [10] (2012)	USA	Drain	39	52 (44–66)	–	All DP	249 (196–290)	450 (300–750)	–	15
		No drain	30	58 (52–68)	–	All DP	195 (176–260)	200 (100–300)	–	
Correa-Gallego et al. [11] (2013)	USA	Drain	553	–	–	PD:386; DP:154	–	–	–	16
		No drain	569	–	–	PD:353; DP:196	–	–	–	
Lim et al. [12] (2013)	France	Drain	27	62 (40–76)	8/19	All PD	300 (180–540)	400 (50–2000)	9	15
		No drain	27	62 (38–78)	8/19	All PD	270 (170–420)	300 (100–2000)	7	
Mehta et al. [13] (2013)	USA	Drain	251	60.0	130/121	All PD	294.3	572	24	15
		No drain	458	62.5	222/236	All PD	200.7	282	10	
Adham et al. [14] (2013)	France	Drain	130	61.5 (20–85)	66/64	PD:79; DP:29; CP:16; E:6	235 ± 71	471 ± 568	15	16
		No drain	112	66.5 (19–85)	61/51	PD:69; DP:37; CP:4; E:2	265 ± 84	379 ± 387	16	

M, male; F, Female; PD, pancreaticoduodenectomy; DP, distal pancreatectomy; CP, central pancreatectomy; E, enucleation.
[a] Jadad composite scale.

Please cite this article in press as: Zhou Y, et al., Evidence-based value of prophylactic intraperitoneal drainage following pancreatic resection: A meta-analysis, Pancreatology (2014), http://dx.doi.org/10.1016/j.pan.2014.04.028