

4 种胰腺残端处理方式预防胰腺远端切除术后胰瘘的 Meta 分析

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【摘要】 目的 系统评价闭合器闭合、手工闭合、闭合器+手工闭合、手工吻合 4 种胰腺残端处理方式预防胰腺远端切除术后胰瘘的临床疗效。方法 以 distal pancreatectomy、left pancreatectomy、distal pancreatic resection、left pancreatic resection、pancreatic fistula、fistula、leak、stapler、suture、anastomosis、胰腺远端切除术、胰体尾切除术、闭合器、手工缝合、吻合、胰瘘为检索词,检索 PubMed、Embase、the Cochrane Library、CBM、CNKI、VANFUN 数据库。检索时间为 1979 年 1 月至 2019 年 1 月。闭合器组:患者术中采用切割闭合器直接行胰腺远端切除离断;手工闭合组:患者术中采用电刀、超声刀等离断胰腺远端后手工缝合胰腺残端;闭合器+手工闭合组:患者术中采用切割闭合器直接切除离断胰腺远端后手工缝合胰腺残端;手工吻合组:患者术中采用电刀、超声刀等离断胰腺远端后将胰腺残端与空肠或胃行手工胰肠或胰胃吻合。由 2 名研究者独立筛选文献并提取数据,进行质量评价。计数资料采用优势比(OR)及其 95%可信区间(95%CI)表示。采用 I^2 对纳入文献进行异质性分析。纳入研究 ≥ 5 篇,采用漏斗图检验潜在发表偏倚;纳入研究 < 5 篇,则不检验。结果 (1)文献检索结果:最终纳入符合标准的相关文献 10 篇。10 篇文献均为前瞻性研究。10 篇文献累积样本量 1 363 例患者,其中闭合器组 565 例,手工闭合组 484 例,闭合器+手工闭合组 182 例,手工吻合组 132 例。(2)Meta 分析结果:①闭合器组与手工闭合组患者胰腺远端切除术后胰瘘发生率比较,差异无统计学意义($OR=0.75, 95\%CI$ 为 $0.45\sim 1.25, P>0.05$)。进一步分析两组患者术后 B 级和 C 级胰瘘发生率比较,差异无统计学意义($OR=0.45, 95\%CI$ 为 $0.14\sim 1.52, P>0.05$)。8 篇文献进行漏斗图分析,其结果显示:漏斗图左右不对称,表明发表偏倚对 Meta 分析结果影响较大。②闭合器+手工闭合组与闭合器组患者胰腺远端切除术后胰瘘发生率比较,差异无统计学意义($OR=0.96, 95\%CI$ 为 $0.48\sim 1.91, P>0.05$)。③闭合器+手工闭合组与手工闭合组患者胰腺远端切除术后胰瘘发生率比较,差异无统计学意义($OR=0.80, 95\%CI$ 为 $0.49\sim 1.32, P>0.05$)。④手工吻合组与闭合器组患者胰腺远端切除术后胰瘘发生率比较,差异无统计学意义($OR=0.73, 95\%CI$ 为 $0.39\sim 1.34, P>0.05$)。进一步分析两组患者术后 B 级和 C 级胰瘘发生率比较,差异无统计学意义($OR=0.60, 95\%CI$ 为 $0.21\sim 1.68, P>0.05$)。5 篇文献进行漏斗图分析,其结果显示:漏斗图左右对称,表明发表偏倚对 Meta 分析结果影响较小。⑤手工吻合组与手工闭合组患者胰腺远端切除术后胰瘘发生率比较,差异有统计学意义($OR=0.24, 95\%CI$ 为 $0.08\sim 0.74, P<0.05$)。5 篇文献进行漏斗图分析,其结果显示:漏斗图左右对称,表明发表偏倚对 Meta 分析结果影响较小。结论 胰腺远端切除术后行手工胰肠、胰胃吻合与手工直接闭合比较,前者有利于降低术后胰瘘发生率;而术后采用闭合器、手工闭合、闭合器+手工闭合处理胰腺残端预防术后胰瘘发生率疗效相当,手工吻合与闭合器预防术后胰瘘发生率疗效相当。

【关键词】 胰瘘; 胰腺远端切除术; 闭合器; 手工缝合; 吻合; Meta 分析

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Prevention value of four treatments of pancreatic stump for pancreatic fistula after distal pancreatectomy: a Meta-analysis

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【Abstract】 Objective To systematically evaluate the clinical effects of four treatments of pancreatic stump including stapler closure, hand-sutured closure, stapler with hand-sutured closure, and manual anastomosis on the prevention of postoperative pancreatic fistula after distal pancreatectomy. **Methods** Databases including PubMed, Embase, the Cochrane Library, CBM, CNKI, and VANFUND were searched for from January 1979 to January 2019 with the key words including “distal pancreatectomy, left pancreatectomy, distal pancreatic resection, left pancreatic resection, pancreatic fistula, fistula, leak, stapler, suture, anastomosis, 胰腺远端切除术, 胰体尾切除术, 闭合器, 手工缝合, 吻合, 胰瘘”. Patients undergoing dissection of distal pancreas with Endo-GIA stapler were allocated into stapler group, patients undergoing hand-sutured closure of pancreatic stump after dissection of distal pancreas with electrocautery or ultrasonic scalpel were allocated into hand-sutured closure group, patients undergoing dissection of distal pancreas with Endo-GIA stapler and hand-sutured closure of pancreatic stump were allocated into stapler with hand-sutured closure group, patients undergoing pancreaticojejunostomy or pancreaticogastrostomy after dissection of distal pancreas were allocated into manual anastomosis group, respectively. Two reviewers independently screened literatures, extracted data and assessed the risk of bias. Count data were described as odds ratio (*OR*) and 95% confidence interval (95% *CI*). The heterogeneity of the studies included was analyzed using the I^2 test. Funnel plot was used to test potential publication bias if the studies included ≥ 5 , and no test was needed if the studies included < 5 . **Results** (1) Document retrieval: a total of 10 available prospective studies were included. There were 1 363 patients, including 565 in the stapler group, 484 in the hand-sutured closure group, 182 in the stapler with hand-sutured closure group, and 132 in the manual anastomosis group. (2) Results of Meta-analysis. ① There was no statistically significant difference in postoperative fistula after distal pancreatectomy between the stapler group and the hand-sutured closure group ($OR = 0.75$, 95% *CI*: 0.45–1.25, $P > 0.05$). Further study showed that there was no statistically significant difference in the incidence of grade B and C postoperative fistula between the two groups ($OR = 0.45$, 95% *CI*: 0.14–1.52, $P > 0.05$). The left-right asymmetry was presented in the funnel plot based on the 8 studies, suggesting that publication bias may exist. ② There was no statistically significant difference in postoperative fistula after distal pancreatectomy between the stapler group and the stapler with hand-sutured closure group ($OR = 0.96$, 95% *CI*: 0.48–1.91, $P > 0.05$). ③ There was no statistically significant difference in postoperative fistula after distal pancreatectomy between the stapler with hand-sutured closure group and manual anastomosis group ($OR = 0.80$, 95% *CI*: 0.49–1.32, $P > 0.05$). ④ There was no statistically significant difference in postoperative fistula after distal pancreatectomy between the manual anastomosis group and the stapler group ($OR = 0.73$, 95% *CI*: 0.39–1.34, $P > 0.05$). Further study showed that there was no statistically significant difference in the incidence of grade B and C postoperative fistula between the two groups ($OR = 0.60$, 95% *CI*: 0.21–1.68, $P > 0.05$). The bilateral symmetry was presented in the funnel plot based on the 5 studies, suggesting that publication bias had little influence on results of Meta-analysis. ⑤ There was no statistically significant difference in postoperative fistula after distal pancreatectomy between the manual anastomosis group and the hand-sutured closure group ($OR = 0.24$, 95% *CI*: 0.08–0.74, $P < 0.05$). The bilateral symmetry was presented in the funnel plot, suggesting that publication bias had little influence on results of Meta-analysis. **Conclusions** Compared with hand-sutured closure, pancreaticojejunostomy or pancreaticogastrostomy after distal pancreatectomy can help to reduce the incidence of postoperative pancreatic fistula. However, there was equivalent prevention value of stapler, hand-sutured closure, and stapler with hand-sutured closure for postoperative fistula after distal pancreatectomy. The manual anastomosis group has equivalent prevention value with stapler group.

【Key words】 Pancreatic fistula; Distal pancreatectomy; Stapler; Manual suture; Anastomosis; Meta-analysis

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胰瘘是胰腺远端切除术后最常见和最严重的并发症,常导致其他相关术后并发症的发生,如腹腔脓肿、腹腔血管破裂出血、胃排空延迟甚至死亡等^[1]。随着胰腺手术的发展,胰腺切除术围术期的胰瘘发

生率和患者病死率不断下降^[2]。然而,胰腺远端切除术后胰瘘发生率仍然较高,为 18.6%~64.9%^[3]。为明确胰腺远端切除术后胰瘘的危险因素,确定有效的预防措施,研究者进行了大量研究,其中胰腺残

端的处理被认为是预防术后胰瘘发生的关键环节之一。目前,胰腺残端处理方式较多,常用技术有手工缝合闭合、闭合器闭合、胰肠或胃吻合等,但尚无一种被广泛认可的方法,能有效降低胰腺远端切除术后胰瘘的发生率^[4-6]。本研究采用 Meta 分析评价闭合器闭合、手工闭合、闭合器+手工闭合、手工吻合 4 种胰腺残端处理方式预防胰腺远端切除术后胰瘘的临床疗效。

1 资料与方法

1.1 文献检索

以 distal pancreatectomy、left pancreatectomy、distal pancreatic resection、left pancreatic resection、pancreatic fistula、fistula、leak、stapler、suture、anastomosis、胰腺远端切除术、胰体尾切除术、闭合器、手工缝合、吻合、胰瘘为检索词,检索 PubMed、Embase、the Cochrane Library、CBM、CNKI、VANFUND 数据库。检索时间为 1979 年 1 月至 2019 年 1 月。检索策略遵循 Cochrane 系统评价手册。

1.2 纳入标准和排除标准

纳入标准:(1)研究类型为分析胰腺远端切除术后胰瘘相关危险因素的临床随机对照试验和前瞻性队列研究。(2)研究对象:行胰腺远端切除术患者,性别、年龄、种族、国籍不限。(3)干预措施:有闭合器闭合、手工闭合、闭合器+手工闭合、手工吻合 4 种技术中的 2 种技术进行比较。闭合器组:患者术中采用切割闭合器直接行胰腺远端切除离断;手工闭合组:患者术中采用电刀、超声刀等离断胰腺远端后手工缝合胰腺残端;闭合器+手工闭合组:患者术中采用切割闭合器直接切除离断胰腺远端后手工缝合胰腺残端;手工吻合组:患者术中采用电刀、超声刀等离断胰腺远端后将胰腺残端与空肠或胃行手工胰肠或胰胃吻合。(4)胰腺远端切除术后的相关定量数据完整。(5)术后胰瘘诊断及分级方法参照国际胰腺外科研究组(ISGPS)标准^[7]。(6)结局指标为胰瘘发生率和临床胰瘘(B、C 级胰瘘)发生率。

排除标准:(1)无法获取全文。(2)试验数据不足。(3)病例报道、综述类、信件和会议摘要。(4)手术方式不相关。(5)没有干预措施的比较。(6)发表文献的作者、机构、内容存在重叠。(7)回顾性病例对照研究。

1.3 文献筛选与数据提取

由 2 名研究者独立筛选文献并提取数据,如有

分歧,通过讨论分析解决。提取的资料包括第一作者、发表年份、国家、研究类型、样本量、人口特征、干预措施。

1.4 文献质量评价

应用 Jadad 质量评分法进行随机对照研究方法学质量评价,评价项目包括:随机序列的产生、随机化隐藏、盲法、撤出与退出^[8]。采用 Newcastle-Ottawa Scale(NOS)量表法进行队列研究方法学质量评价^[9]。评价项目包括:研究对象、组间可比性、暴露因素测量、结果评估等。文献质量评分 ≥ 6 的研究为高质量文献。

1.5 统计学分析

应用 RevMan 5.3 统计软件进行 Meta 分析。计数资料采用优势比(odds ratio, OR)及其 95% 可信区间(95% confidence interval, 95% CI)表示。采用 I^2 对纳入文献进行异质性分析,若 $I^2 < 50\%$ 或 $P > 0.10$, 认为各研究间无异质性,采用固定效应模型;若 $I^2 \geq 50\%$ 或 $P \leq 0.10$, 认为各研究间存在异质性,采用随机效应模型。纳入研究 ≥ 5 篇,采用漏斗图检验潜在发表偏倚;纳入研究 < 5 篇,则不检验。 $P < 0.05$ 为差异有统计学意义。

2 结果

2.1 文献检索结果

最终纳入符合标准的相关文献 10 篇^[5-6,10-17]。文献筛选流程见图 1。10 篇文献均为前瞻性研究。10 篇文献累积样本量为 1 363 例患者,其中闭合器组 565 例,手工闭合组 484 例,闭合器+手工闭合组 182 例,手工吻合组 132 例。纳入文献的基本特征见表 1。

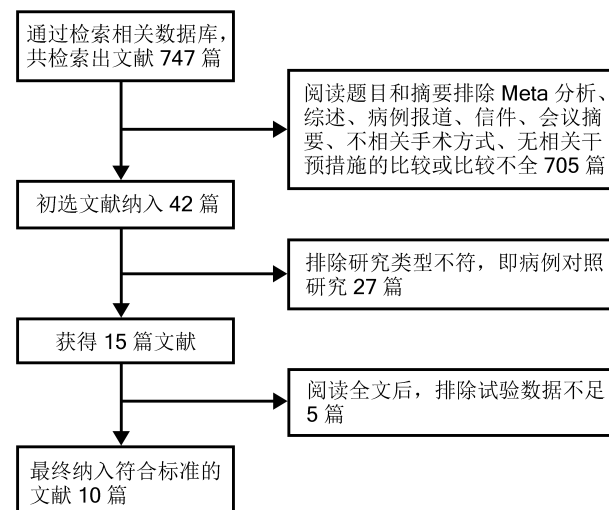


图 1 文献筛选流程图

表 1 纳入文献研究的基本特征

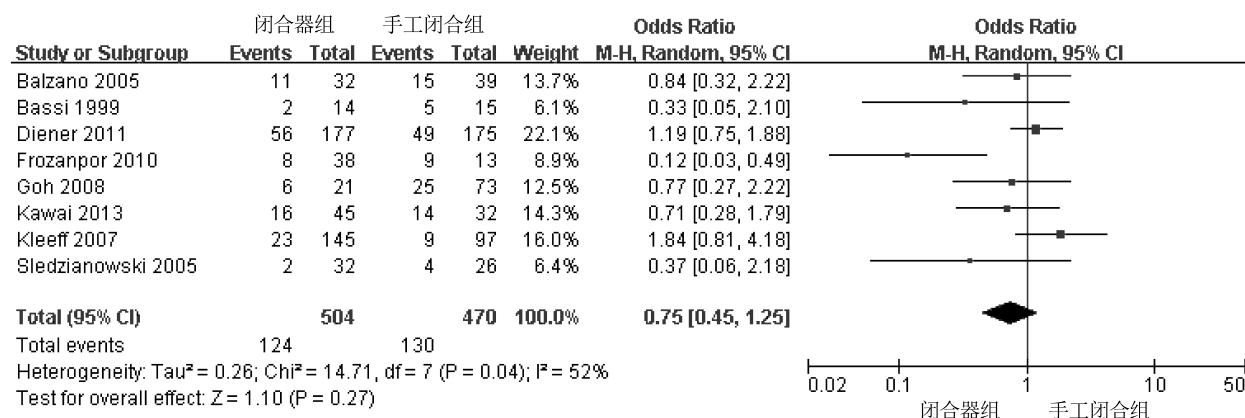
作者	发表年份	国家	研究类型	样本量 (例)	性别(男/女,例)	闭合器组 (例)	手工闭合组 (例)	闭合器+手工闭合组 (例)	手工吻合组 (例)	质量评分 (分)
Bassi 等 ^[10]	1999	意大利	随机对照研究	69 ^a	19/50	14	15	-	14	7
Adam 等 ^[11]	2001	德国	前瞻性队列研究	41	19/22	-	14	-	27	8
Sledzianowski 等 ^[12]	2005	法国	前瞻性队列研究	61	24/37	32	26	-	3	7
Balzano 等 ^[13]	2005	意大利	前瞻性队列研究	123	52/71	32	39	52	-	8
Kleeff 等 ^[14]	2007	德国	前瞻性队列研究	302 ^a	154/148	145	97	-	24	8
Goh 等 ^[15]	2008	新加坡	前瞻性队列研究	232 ^a	102/130	21	73	130	2	7
Frozanpor 等 ^[16]	2010	瑞典	前瞻性队列研究	51	12/39	38	13	-	-	8
Diener 等 ^[5]	2011	德国	随机对照研究	352	161/191	177	175	-	-	6
Kawai 等 ^[17]	2013	日本	前瞻性队列研究	122 ^a	65/57	45	32	-	-	8
Kawai 等 ^[6]	2016	日本	随机对照研究	123	79/44	61	-	-	62	7

注:闭合器组为患者术中采用切割闭合器直接行胰腺远端切除离断;手工闭合组为患者术中采用电刀、超声刀等离断胰腺远端后手工缝合胰腺残端;闭合器+手工闭合组为患者术中采用切割闭合器直接切除离断胰腺远端后手工缝合胰腺残端;手工吻合组为患者术中采用电刀、超声刀等离断胰腺远端后将胰腺残端与空肠或胃行手工胰肠或胰胃吻合;^a患者行胰腺远端切除术后施行了闭合器闭合、手工闭合、闭合器+手工闭合、手工吻合以外的其他胰腺残端处理;“-”表示文中未采用该胰腺残端处理方式

2.2 Meta 分析结果

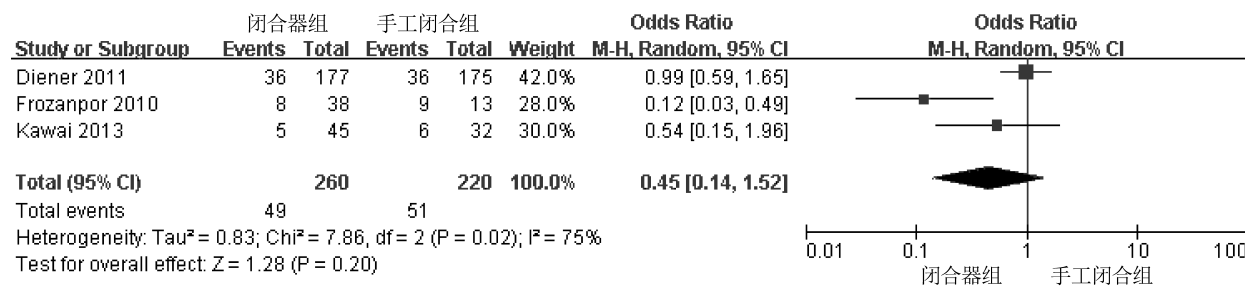
2.2.1 闭合器组与手工闭合组比较:8 篇文献报道了闭合器组与手工闭合组患者胰腺远端切除术后胰瘘发生情况^[5,10,12-17]。各研究间存在异质性 ($I^2 = 52\%$, $P < 0.10$),采用随机效应模型进行分析。Meta 分析结果显示:两组患者术后胰瘘发生率比较,差异无统计学意义 ($OR = 0.75$, $95\%CI$ 为 $0.45 \sim 1.25$, $P > 0.05$)。见图 2。其中 3 篇文献进一步分析了两组

患者 B 级和 C 级胰瘘发生情况^[5,16-17]。各研究间存在异质性 ($I^2 = 75\%$, $P < 0.10$),采用随机效应模型进行分析。Meta 分析结果显示:两组患者术后 B 级和 C 级胰瘘发生率比较,差异无统计学意义 ($OR = 0.45$, $95\%CI$ 为 $0.14 \sim 1.52$, $P > 0.05$)。见图 3。8 篇文献进行漏斗图分析,其结果显示:漏斗图左右不对称,表明发表偏倚对 Meta 分析结果影响较大。见图 4。



注:闭合器组为患者术中采用切割闭合器直接行胰腺远端切除离断;手工闭合组为患者术中采用电刀、超声刀等离断胰腺远端后手工缝合胰腺残端

图 2 闭合器组与手工闭合组患者胰腺远端切除术后胰瘘发生率的 Meta 分析结果



注:闭合器组为患者术中采用切割闭合器直接行胰腺远端切除离断;手工闭合组为患者术中采用电刀、超声刀等离断胰腺远端后手工缝合胰腺残端

图 3 闭合器组与手工闭合组患者胰腺远端切除术后 B 级和 C 级胰瘘发生率的 Meta 分析结果

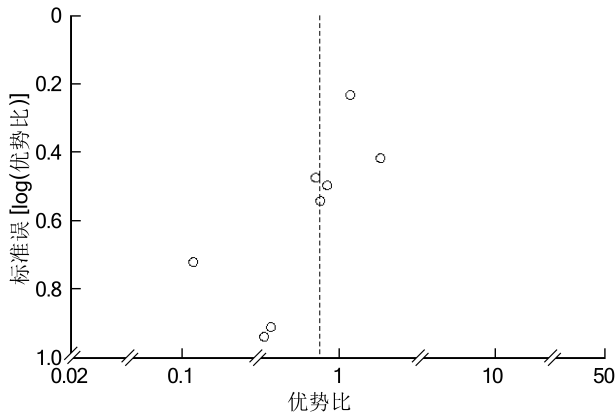


图 4 8 篇纳入文献发表偏倚的 Meta 分析漏斗图

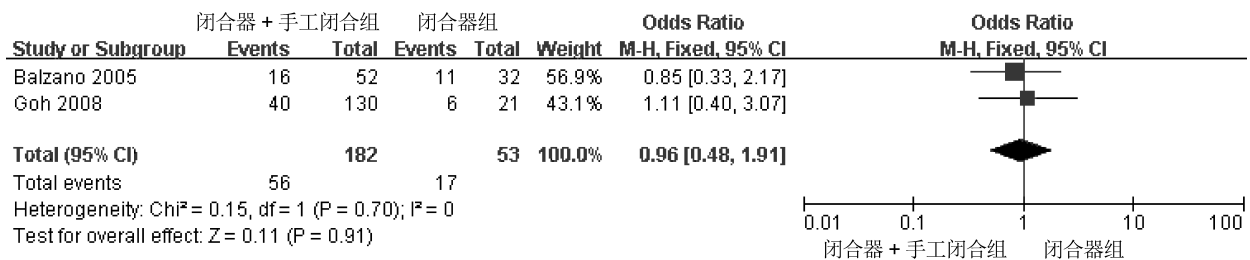
2.2.2 闭合器+手工闭合组与闭合器组比较:2 篇文献报道了闭合器+手工闭合组与闭合器组患者胰腺远端切除术后胰瘘发生情况^[13,15]。各研究间不存在异质性 ($I^2=0, P>0.10$), 采用固定效应模型进行分析。Meta 分析结果显示: 两组患者术后胰瘘发生率比较, 差异无统计学意义 ($OR=0.96, 95\%CI$ 为 $0.48\sim1.91, P>0.05$)。见图 5。

2.2.3 闭合器+手工闭合组与手工闭合组比较:2 篇文献报道了闭合器+手工闭合组与手工闭合组患者胰腺远端切除术后胰瘘发生情况^[13,15]。各研究间不存在异质性 ($I^2=0, P>0.10$), 采用固定效应模型进行分析。Meta 分析结果显示: 两组患者术后胰瘘发生率比较, 差异无统计学意义 ($OR=0.80, 95\%CI$

为 $0.49\sim1.32, P>0.05$)。见图 6。

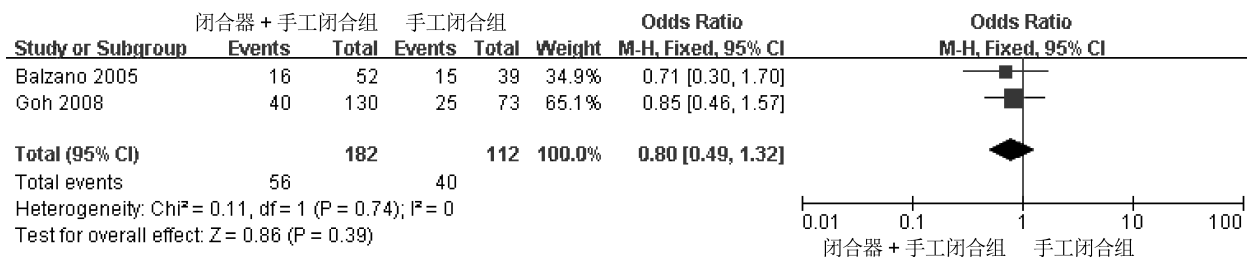
2.2.4 手工吻合组与闭合器组比较:5 篇文献报道了手工吻合组与闭合器组患者胰腺远端切除术后胰瘘发生情况^[6,10,12,14-15]。各研究间不存在异质性 ($I^2=0, P>0.10$), 采用固定效应模型进行分析。Meta 分析结果显示: 两组患者术后胰瘘发生率比较, 差异无统计学意义 ($OR=0.73, 95\%CI$ 为 $0.39\sim1.34, P>0.05$)。见图 7。其中 2 篇文献进一步分析了两组患者 B 级和 C 级胰瘘发生情况^[6,15]。各研究间不存在异质性 ($I^2=0, P>0.10$), 采用固定效应模型进行分析。Meta 分析结果显示: 两组患者术后 B 级和 C 级胰瘘发生率比较, 差异无统计学意义 ($OR=0.60, 95\%CI$ 为 $0.21\sim1.68, P>0.05$)。见图 8。5 篇文献进行漏斗图分析, 其结果显示: 漏斗图左右对称, 表明发表偏倚对 Meta 分析结果影响较小。见图 9。

2.2.5 手工吻合组与手工闭合组比较:5 篇文献报道了手工吻合组与手工闭合组患者胰腺远端切除术后胰瘘发生情况^[10-12,14-15]。各研究间不存在异质性 ($I^2=0, P>0.10$), 采用固定效应模型进行分析。Meta 分析结果显示: 两组患者术后胰瘘发生率比较, 差异有统计学意义 ($OR=0.24, 95\%CI$ 为 $0.08\sim0.74, P<0.05$)。见图 10。5 篇文献进行漏斗图分析, 其结果显示: 漏斗图左右对称, 表明发表偏倚对 Meta 分析结果影响较小。见图 11。



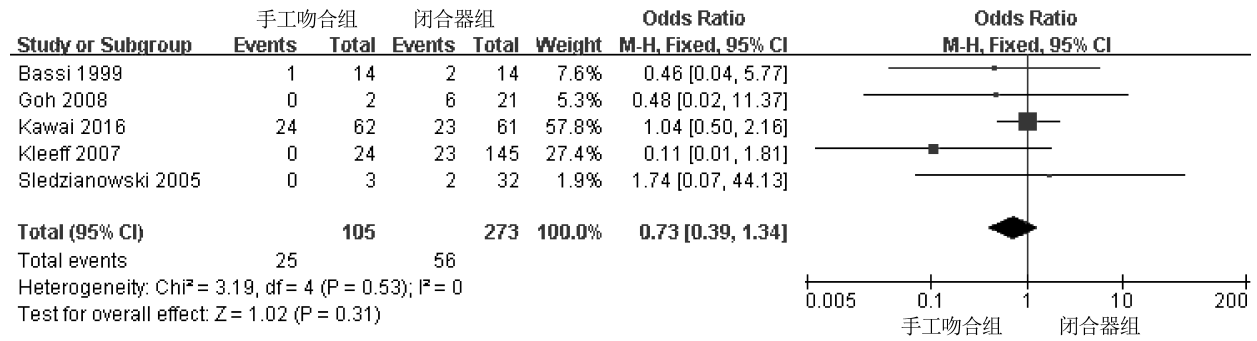
注: 闭合器+手工闭合组为患者术中采用切割闭合器直接切除离断胰腺远端后手工缝合胰腺残端; 闭合器组为患者术中采用切割闭合器直接行胰腺远端切除离断

图 5 闭合器+手工闭合组与闭合器组患者胰腺远端切除术后胰瘘发生率的 Meta 分析结果



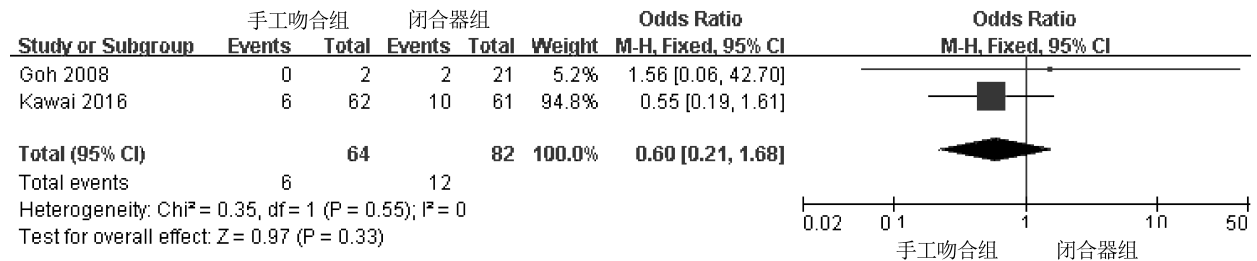
注: 闭合器+手工闭合组为患者术中采用切割闭合器直接切除离断胰腺远端后手工缝合胰腺残端; 手工闭合组为患者术中采用电刀、超声刀等离断胰腺远端后手工缝合胰腺残端

图 6 闭合器+手工闭合组与手工闭合组患者胰腺远端切除术后胰瘘发生率的 Meta 分析结果



注:手工吻合组为患者术中采用电刀、超声刀等离断胰腺远端后将胰腺残端与空肠或胃行手工胰肠或胰胃吻合;闭合器组为患者术中采用切割闭合器直接行胰腺远端切除离断

图 7 手工吻合组与闭合器组患者胰腺远端切除术后胰瘘发生率的 Meta 分析结果



注:手工吻合组为患者术中采用电刀、超声刀等离断胰腺远端后将胰腺残端与空肠或胃行手工胰肠或胰胃吻合;闭合器组为患者术中采用切割闭合器直接行胰腺远端切除离断

图 8 手工吻合组与闭合器组患者胰腺远端切除术后 B 级和 C 级胰瘘发生率的 Meta 分析结果

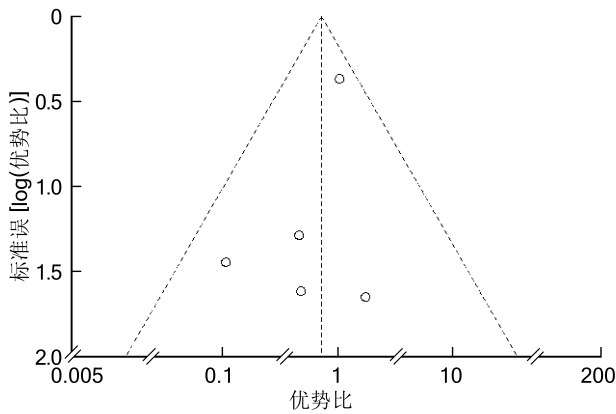
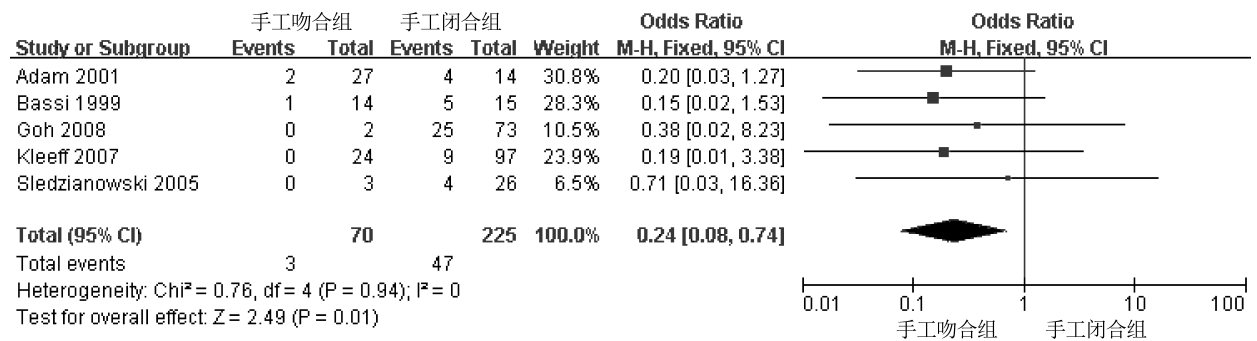


图 9 5 篇纳入文献发表偏倚的 Meta 分析漏斗图

3 讨论

胰瘘是胰腺切除术后发生率最高、后果最严重的并发症,是决定胰腺切除术后预后的最主要因素,对手术相关病死率、住院时间和医疗费用有重要影响^[18-21]。由于胰瘘的诊断及分级标准不完全一致,导致不同文献报道的胰瘘发生率差别较大,特别是部分较早的研究^[19,22-23]。本研究中术后胰瘘诊断及分级方法参照 ISGPS 标准,胰瘘发生率具有可比性^[19]。

Bassi 等^[10]开展的闭合器与手工闭合前瞻性随机对照研究,其研究结果显示:两种吻合方式均未降



注:手工吻合组为患者术中采用电刀、超声刀等离断胰腺远端后将胰腺残端与空肠或胃行手工胰肠或胰胃吻合;手工闭合组为患者术中采用电刀、超声刀等离断胰腺远端后手工缝合胰腺残端

图 10 手工吻合组与手工闭合组患者胰腺远端切除术后胰瘘发生率的 Meta 分析结果

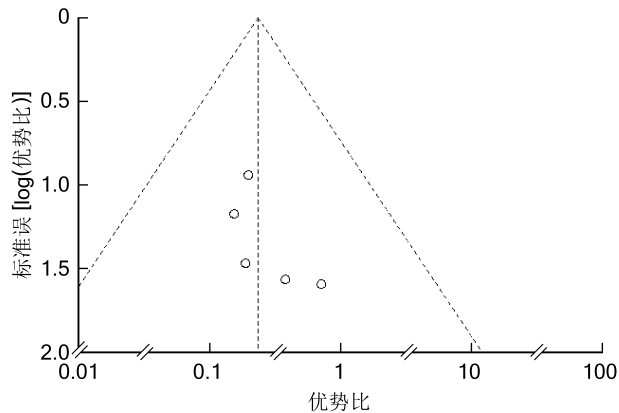


图 11 5 篇纳入文献发表偏倚的 Meta 分析漏斗图

低术后胰瘘发生率,但该研究较早且样本量少。而 Goh 等^[15]和 Frozanpor 等^[16]的研究结果显示:闭合器组患者胰瘘发生率低于手工闭合组。但 Kleeff 等^[14]报道手工闭合组患者术后胰瘘发生率低于闭合器组。已有的多项研究结果均显示:闭合器组与手工闭合组患者的胰体尾切除术后胰瘘发生率比较,差异无统计学意义^[5,24-27]。但胰体尾切除术后胰瘘发生率可能受术者缝合方式(褥式缝合、U 型缝合及连续缝合等),缝线种类(薇乔线、Prolene 线等),缝线直径(3-0 或 4-0)及术中器械操作不当等手术操作本身因素的影响。因此,闭合器闭合是胰腺残端闭合的可靠方法。改进闭合器以及根据胰腺厚度选择合适闭合器,可以提高其闭合效果。闭合器+手工闭合组分别与闭合器组、手工闭合组比较,胰腺远端切除术后胰瘘发生率比较,差异均无统计学意义,闭合器+手工闭合组甚至会增加手术风险^[13,15]。Pulvirenti 等^[25]的回顾性研究结果显示:闭合器+手工闭合组与闭合器组比较,前者可降低胰体尾切除术后胰瘘发生率。术中采用联合方式,不排除术者的主观因素影响,如胰腺质地较软、主胰管直径较粗的高风险患者,术者可能更倾向于采用联合方式^[28]。

本研究结果显示:手工吻合组与闭合器组患者术后胰瘘发生率比较,差异无统计学意义;而手工吻合组与手工闭合组比较,前者能降低胰腺远端切除术后胰瘘发生率。已有的回顾性和 Meta 分析研究结果显示:胰腺远端切除术后手工胰空肠吻合术和手工胰胃吻合术后胰瘘发生率低于直接闭合组^[14-15,24,29-34]。但部分研究结果也得出了不同的结论。日本的一项随机对照研究结果显示:手工吻合组和手工闭合组患者术后胰瘘发生率比较,差异无统计学意义^[17]。而 Adam 等^[11]认为:手工吻合是术

后胰瘘的一项高危因素。结合本研究结果和上述文献报道,笔者认为:胰肠和胰胃手工吻合术可以作为预防胰腺远端切除术后胰瘘发生的有效措施。但该结论仍需要大样本、多中心的随机对照试验进一步验证。

综上,胰腺远端切除术后行手工胰肠、胰胃吻合与手工直接闭合比较,前者有利于降低术后胰瘘的发生率;而闭合器、手工闭合、闭合器+手工闭合处理胰腺残端预防术后胰瘘发生率疗效相当;手工吻合组与闭合器组预防术后胰瘘发生率疗效相当。由于纳入的随机对照试验较少和文献质量存在局限性,上述结论仍需大样本、高质量的前瞻性随机对照研究进一步验证。

利益冲突 所有作者均声明不存在利益冲突

参 考 文 献

- [1] Miyasaka Y, Mori Y, Nakata K, et al. Attempts to prevent postoperative pancreatic fistula after distal pancreatectomy [J]. Surg Today, 2017, 47(4): 416-424. DOI: 10.1007/s00595-016-1367-8.
- [2] Hüttner FJ, Koessler-Ebs J, Hackert T, et al. Meta-analysis of surgical outcome after enucleation versus standard resection for pancreatic neoplasms [J]. Br J Surg, 2015, 102(9): 1026-1036. DOI: 10.1002/bjs.9819.
- [3] Ricci C, Casadei R, Buscemi S, et al. Laparoscopic distal pancreatectomy: what factors are related to the learning curve? [J]. Surg Today, 2015, 45(1): 50-56. DOI: 10.1007/s00595-014-0872-x.
- [4] Peng YP, Zhu XL, Yin LD, et al. Risk factors of postoperative pancreatic fistula in patients after distal pancreatectomy: A systematic review and meta-analysis [J]. Sci Rep, 2017, 7(1): 185. DOI: 10.1038/s41598-017-00311-8.
- [5] Diener MK, Seiler CM, Rössion I, et al. Efficacy of stapler versus hand-sewn closure after distal pancreatectomy (DISPACT): A randomised, controlled multicentre trial [J]. Lancet, 2011, 377(9776): 1514-1522. DOI: 10.1016/S0140-6736(11)60237-7.
- [6] Kawai M, Hirono S, Okada K, et al. Randomized controlled trial of pancreaticojejunostomy versus stapler closure of the pancreatic stump during distal pancreatectomy to reduce pancreatic fistula [J]. Ann Surg, 2016, 264(1): 180-187. DOI: 10.1097/SLA.0000000000001395.
- [7] Bassi C, Butturini G, Molinari E, et al. Pancreatic fistula rate after pancreatic resection. The importance of definitions [J]. Dig Surg, 2004, 21(1): 54-59. DOI: 10.1159/000075943.
- [8] Jadad AR, Moore RA, Carroll D, et al. Assessing the quality of reports of randomized clinical trials: is blinding necessary? [J]. Control Clin Trials, 1996, 17(1): 1-12.
- [9] Stang A. Critical evaluation of the Newcastle-Ottawa scale for the assessment of the quality of nonrandomized studies in meta-analyses [J]. Eur J Epidemiol, 2010, 25(9): 603-605. DOI: 10.1007/s10654-010-9491-z.
- [10] Bassi C, Butturini G, Falconi M, et al. Prospective randomised pilot study of management of the pancreatic stump following distal resection [J]. HPB, 1999, 1(4): 203-207. DOI: 10.1016/s1365-182x(17)30671-8.
- [11] Adam U, Makowiec F, Riediger H, et al. Distal pancreatic resection: indications, techniques and complications [J]. Zentralbl Chir, 2001, 126(11): 908-912. DOI: 10.1055/s-2001-19149.

[12] Sledzianowski JF, Duffas JP, Muscari F, et al. Risk factors for mortality and intra-abdominal morbidity after distal pancreatectomy [J]. *Surgery*, 2005, 137(2): 180-185. DOI: 10.1016/j.surg.2004.06.063.

[13] Balzano G, Zerbi A, Cristallo M, et al. The unsolved problem of fistula after left pancreatectomy: the benefit of cautious drain management[J]. *J Gastrointest Surg*, 2005, 9(6): 837-842. DOI: 10.1016/j.gassur.2005.01.287.

[14] Kleeff J, Diener MK, Z'graggen K, et al. Distal pancreatectomy: risk factors for surgical failure in 302 consecutive cases[J]. *Ann Surg*, 2007, 245(4): 573-582. DOI: 10.1097/01.sla.0000251438.43135.fb.

[15] Goh BK, Tan YM, Chung YF, et al. Critical appraisal of 232 consecutive distal pancreatectomies with emphasis on risk factors, outcome, and management of the postoperative pancreatic fistula: A 21-year experience at a single institution[J]. *Arch Surg*, 2008, 143(10): 956-965. DOI: 10.1001/archsurg.143.10.956.

[16] Frozanpor F, Albiin N, Linder S, et al. Impact of pancreatic gland volume on fistula formation after pancreatic tail resection[J]. *JOP*, 2010, 11(5): 439-443.

[17] Kawai M, Tani M, Okada K, et al. Stump closure of a thick pancreas using stapler closure increases pancreatic fistula after distal pancreatectomy[J]. *Am J Surg*, 2013, 206(3): 352-359. DOI: 10.1016/j.amjsurg.2012.11.023.

[18] 张磊, 楼文晖.《胰腺术后外科常见并发症诊治及预防的专家共识(2017)》胰瘘部分更新介绍及解读[J]. *浙江医学*, 2017, 39(17): 1405-1407.

[19] Bassi C, Marchegiani G, Dervenis C, et al. The 2016 update of the International Study Group (ISGPS) definition and grading of postoperative pancreatic fistula: 11 Years After [J]. *Surgery*, 2017, 161(3): 584-591. DOI: 10.1016/j.surg.2016.11.014.

[20] 陈继业, 冯健, 王宪强, 等. 胰十二指肠切除术后胰瘘危险因素分析[J]. *中国现代普通外科进展*, 2015, 18(3): 192-195. DOI: 10.3969/j.issn.1009-9905.2015.03.007.

[21] 张煜, 杜立学, 吴武军, 等. 胰十二指肠切除术后胰瘘的预防体会[J]. *中国现代普通外科进展*, 2012, 15(9): 739-741. DOI: 10.3969/j.issn.1009-9905.2012.09.024.

[22] 姜文营, 王振峰, 秦宪涛, 等. 改良胰管空肠吻合方式在胰十二指肠切除术中的临床应用[J]. *中国现代普通外科进展*, 2018, 21(4): 267-270. DOI: 10.3969/j.issn.1009-9905.2018.04.004.

[23] Suc B, Msika S, Fingerhut A, et al. Temporary fibrin glue occlusion of the main pancreatic duct in the prevention of intra-abdominal complications after pancreatic resection: prospective randomized trial[J]. *Ann Surg*, 2003, 237(1): 57-65. DOI: 10.1097/0000658-200301000-00009.

[24] Zhang H, Zhu F, Shen M, et al. Systematic review and meta-analysis comparing three techniques for pancreatic remnant closure following distal pancreatectomy[J]. *Br J Surg*, 2015, 102(1): 4-15. DOI: 10.1002/bjs.9653.

[25] Pulvirenti A, Landoni L, Borin A, et al. Reinforced stapler versus ultrasonic dissector for pancreatic transection and stump closure for distal pancreatectomy: A propensity matched analysis[J]. *Surgery*, 2019; S0039-S6060(19)30108-4. DOI: 10.1016/j.surg.2019.02.016.

[26] Ecker BL, McMillan MT, Allegrini V, et al. Risk factors and mitigation strategies for pancreatic fistula after distal pancreatectomy: analysis of 2026 resections from the international, multi-institutional distal pancreatectomy study group [J]. *Ann Surg*, 2019, 269(1): 143-149. DOI: 10.1097/SLA.0000000000002491.

[27] 中华消化外科菁英荟胰腺外科学组. 胰腺常规手术术后胰瘘的预防及引流管理[J]. *中华消化外科杂志*, 2018, 17(1): 55-59. DOI: 10.3760/cma.j.issn.1673-9752.2018.01.015.

[28] Hashimoto Y, Traverso LW. After distal pancreatectomy pancreatic leakage from the stump of the pancreas may be due to drain failure or pancreatic ductal back pressure[J]. *J Gastrointest Surg*, 2012, 16(5): 993-1003. DOI: 10.1007/s11605-012-1849-y.

[29] Wagner M, Gloor B, Ambühl M, et al. Roux-En-Y drainage of the pancreatic stump decreases pancreatic fistula after distal pancreatic resection[J]. *J Gastrointest Surg*, 2007, 11(3): 303-308. DOI: 10.1007/s11605-007-0094-2.

[30] Meniconi RL, Caronna R, Borreca D, et al. Pancreato-jejunostomy versus hand-sewn closure of the pancreatic stump to prevent pancreatic fistula after distal pancreatectomy: A retrospective analysis[J]. *BMC Surg*, 2013, 13: 23. DOI: 10.1186/1471-2482-13-23.

[31] Yanagimoto H, Satoi S, Toyokawa H, et al. Pancreaticogastrostomy following distal pancreatectomy prevents pancreatic fistula-related complications[J]. *J Hepatobiliary Pancreat Sci*, 2014, 21(7): 473-478. DOI: 10.1002/jhbp.59.

[32] Kilambi R, Singh AN. Randomized controlled trial of pancreatico-jejunostomy versus stapler closure of the pancreatic stump during distal pancreatectomy to reduce pancreatic fistula[J]. *Ann Surg*, 2018, 267(2): e37. DOI: 10.1097/SLA.0000000000002032.

[33] Kondo N, Uemura K, Nakagawa N, et al. A multicenter, randomized, controlled trial comparing reinforced staplers with bare staplers during distal pancreatectomy (HiSCO-07 trial) [J]. *Ann Surg Oncol*, 2019, 26(5): 1519-1527. DOI: 10.1245/s10434-019-07222-0.

[34] Hamilton NA, Porembka MR, Johnston FM, et al. Mesh reinforcement of pancreatic transection decreases incidence of pancreatic occlusion failure for left pancreatectomy: A single-blinded, randomized controlled trial [J]. *Ann Surg*, 2012, 255(6): 1037-1042. DOI: 10.1097/SLA.0b013e31825659ef.

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Zhang Mingxiong, Zhu Ya, Wang Wei, et al. Prevention value of four treatments of pancreatic stump for pancreatic fistula after distal pancreatectomy: a Meta-analysis [J]. *Chin J Dig Surg*, 2019, 18(7): 675-682. DOI: 10.3760/cma.j.issn.1673-9752.2019.07.012.

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