

Meta-Analysis and Systemic Review of Different Reconstruction Methods for Gastric Carcinoma Following Distal Gastrectomy

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Abstract

Aims: This Meta-analysis was conducted to compare the different reconstruction methods for gastric carcinoma following distal gastrectomy among Billroth I (BI), Billroth II (BII) and Roux-en-Y (RY).

Methods: PubMed, EMBASE, Science Citation Index Expanded and Cochrane library were searched from inception to November 2015. Characteristic data on perioperative period and long-term complications were collected, systemized and conducted with Review Manager version 5.3.2 (RevMan), of which, dichotomous variables were evaluated by odds ratio (OR), and continuous variables were merged using the mean difference (MD). Funnel figures were plotted to assess the publication bias.

Results: Thirty articles were included, RY had advantages in less incidence of reflux symptoms, including esophagitis (BI vs BII, $P = 0.550$; BII vs RY, $P = 0.002$; BI vs RY, $P = 0.010$), gastritis (BI vs BII $P = 0.87$; BII vs RY $P < 0.00001$; BI vs RY $P = 0.0002$) and bile refluxed (BI vs BII $P < 0.00001$; BII vs RY $P < 0.00001$; BI vs RY $P < 0.0001$). BI was performed in the shortest operation time (BI vs BII, $P = 0.001$; BII vs RY, $P < 0.0001$; BI vs RY, $P < 0.00001$).

Conclusion: RY reconstruction seems to be an effective alternative method to BI and BII reconstruction in fewer incidences of reflux symptoms for gastric carcinoma following distal gastrectomy. In addition, preponderance of evidence indicated BI reconstruction could be performed in the shortest time.

Keywords: Gastric Carcinoma; Reconstruction Method; Distal Gastrectomy; Meta-analysis

Introduction

According to global cancer statistics, it is estimated that there were 631,300 new gastric carcinoma cases for male all over the world, ranking the fourth of all cancer cases; and 320,300 for female, ranking at the fifth place, this situation is worse in Eastern Asia, South America and Eastern Europe [1]. In general, surgery was regarded as the only method that may cure gastric carcinoma, especially for early gastric carcinoma. For decades, the survival rate of gastric carcinoma has been improved [2], meanwhile it is important to improve the quality of life for carcinoma patients. Reconstruction method after gastrectomy is regarded as an important factor influencing the life quality [3-5]. Many surgeons regard RY reconstruction as the preferred method following distal gastrectomy for gastric carcinoma [6-7]. Nevertheless, BI and BII reconstruction are still widely performed by surgeons in eastern countries [8-10]. So evidence-based medicine is needed to compare the difference between the three reconstruction methods.

Although, similar Meta-analysis has been published for 4 years, we think that it may exist some mistakes and isn't in accordance with its conclusion [11]. The aim of this Meta-analysis is to summarize the evidence for reconstruction method for distal gastrectomy following

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gastric carcinoma by its characteristic data on perioperative period and long-term complications, and hope to be a guideline for clinical practice.

Method

Literature Search

A systematic search was conducted in PubMed, EMBASE, Science Citation Index Expanded and Cochrane library (via Wiley) from inception to November 2015. Keywords “reconstruction method” was used in combination with “gastric carcinoma” and “distal gastrectomy”. Meta-analysis was performed according to PRISMA statement [12].

Inclusion criteria

1. At least two of the reconstruction methods were reported in the article; 2. Written in English; 3. At least one of the following words (BMI, operation time, operation bleeding, flatus time, time of first diet, postoperative hospital days, total complication, wound infection, bleeding, dumping syndrome, esophagitis, gastritis, bile refluxed, anastomotic leakage, delayed gastric, mortality) or synonym presents; 4. The latest article was preferable for similar works; 5. Data were completely enough to obtain the mean difference (or odds rate [OR]) and the 95% confidence interval (CI); 6. Participants should be more than 10 in each group to decrease the accidental events; 7. All the involved articles had stated their ethical approval clearly and are in compliance with the Helsinki declaration.

Exclusion criteria

1. The surgery was not performed on human beings; 2. Other organs (part of pancreas, spleen) was resected; 3. Single arm research; 4. System review or case report; 5. Full articles couldn't be searched.

Data extraction and quality assessment

All data were extracted and dealt by two authors (Shuailong Yang and Fangfang Chen) independently. If they couldn't reach an agreement, they would consult with the third author (Shuyi Wang). Cochrane Handbook version 5.3.2 was scored for random controlled trial (RCT) articles; meanwhile, Newcastle-Ottawa quality assessment scale was carried out for case control study (CCS) articles.

Statistical analysis

Review Manager Version 5.3.2 (The Cochrane Collaboration, Oxford, United Kingdom) was used to perform our Meta-analysis. Forest plots were made to compare the differences between each two of the groups, for most including publications are not RCTs, fixed effects were not a suitable choice for our analysis, so analysis model for all results were random effects. Dichotomous variables were evaluated by odds ratio (OR), and continuous variables were merged using the mean difference (MD). Funnel figures was plotted to assess the publication bias.

According to statistics, proper significance level would be established before scientific experiments. Generally, it is 0.05, and sometimes 0.01 is used to get a more effective persuasion. Analysis of variance is adopted to compare the significant difference among three groups, and if we want to know the difference between each two groups, changed arithmetic method or adjusted the significance level would be adopted [13-14]. Similarly, adjusting the significance level could be a method for the comparison among three groups, we need analyze for three times. So 0.017 (0.05 divided into three) is a suitable choice.

Results

Publication research results

Among 591 articles extracted, 517 articles were excluded as they were reviews, case report, only a reconstruction method, or limited number of participants, etc; 30 articles were not published in English; 14 articles could not get the full articles and failed to connect with the authors. As a result, 30 articles were included (8 RCTs and 22 CCSs), among which 6 articles were about BI, BII and RY (1 RCT and 5 CCSs), 18 articles compared BI with RY (5 RCTs and 13 CCSs), 3 articles had a comparison between BI and BII (1 RCT and 2 CCSs), for BII

and RY, 1 RCT and 2 CCSs were mentioned (Table 1a and Table 1b). Moreover, relationship between reconstruction method and years of publications had been calculated with the result showing no significant difference ($P = 0.550$) (Table 2).

Articles	Reconstruction method			Design	experimental method	Follow up	Operation method	Country	Quality score
	BI	RY	BII						
Namikawa T 2010 [3]	47	38	--	Retrospective	Yes	No	Open	Japan	5
Shinoto K 2003 [5]	43	20	28	Retrospective	Yes	Yes	Unknow	Japan	7
Kim CH 2015 [7]	165	371	161	Retrospective	Yes	No	Laparoscopy	Korea	6
Kumagai K 2011 [8]	329	95	--	Retrospective	Yes	No	Laparoscopy	Japan	6
Chan DC 2007 [10]*	--	19	41	Retrospective	Yes	No	Unknow	China	5
Osugi H 2004 [15]	25	18	17	Retrospective	Yes	Yes	Open	Japan	6
Sah BK 2009 [17]	626	--	183	Retrospective	Yes	No	Both	China	6
Fukuhara K 2002 [18]	41	29	22	Retrospective	Yes	No	Open	Japan	6
Nakagawara H 2003 [19]	20	17	22	Retrospective	Yes	Yes	Open	Japan	7
Kubo M 2002 [20]	175	93	--	Retrospective	Yes	Yes	Unknow	Japan	6
Nomura E 2011 [21]	68	43	--	Retrospective	Yes	No	Laparoscopy	Japan	5
Nunobe S 2007 [22]	203	182	--	Retrospective	Yes	Yes	Unknow	Japan	6
Kojima K 2008 [23]	65	68	--	Retrospective	Yes	Yes	Laparoscopy	Japan	7
Kim TG 2011 [24]	72	26	--	Retrospective	Yes	No	Both	Korea	6
Tanaka S 2011 [25]	50	51	--	Retrospective	Yes	No	Unknow	Japan	6
Inokuchi M 2013 [26]	89	83	--	Retrospective	Yes	No	Laparoscopy	Japan	5
Lee SW 2012 [27]	248	128		Retrospective	Yes	No	Laparoscopy	Japan	5
An JY 2013 [28]	50	50	--	Retrospective	Yes	No	Laparoscopy	Korea	5
Komatsu S 2013 [29]	74	43	--	Retrospective	Yes	Yes	Laparoscopy	Japan	7
Chen CJ 2012 [30]	--	283	236	Retrospective	Yes	No	Unknow	China	5
Kyzer S 1997 [32]	41	--	43	Retrospective	Yes	No	Open	Israel	6
Kang K 2011 [33]	875	384	--	Retrospective	Yes	Yes	Laparoscopy	Korea	6

*: Billroth II (B-II) with Braun anastomosis.

Table 1a: Parameters for publications.

Articles	Reconstruction method			Design	Blind	Random-ization	Experimental method	Follow up	Operation method	Country	Quality score
	BI	RY	BII								
Lee MS 2011 [4]*	49	47	52	Randomize	Single	Yes	Yes	Yes	Laparoscopy	Korea	A
Tanaka K 2014 [6]	103	118		Randomize	Single	Yes	Yes	No	Both	Japan	B
Imamura H 2012 [9]	163	169		Randomize	Single	Yes	Yes	No	Both	Japan	B
Chareton B 1996 [31]	30		32	Randomize	Single	Yes	Yes	No	Laparoscopy	America	B

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Ishikawa M 2005 [34]	26	24		Randomize	Single	Yes	Yes	Yes	Open	Japan	B
Takiguchi S 2011 [35]	132	136		Randomize	Single	Yes	Yes	Yes	Both	Japan	A
Hirao M 2013 [36]	163	169		Randomize	Single	Yes	Yes	Yes	Both	Japan	A
Pacelli F 2013 [37]		136	134	Randomize	Single	Yes	Yes	No	Open	Italy	B

*: Billroth II (B-II) with Braun anastomosis.

Table 1b: Parameters for publications.

Years of publications	BI	BII	RY
	n(%)	n(%)	n(%)
Year before 2004	8 (26.9)	6 (19.2)	6 (38.5)
2005-2011	10 (42.3)	3 (42.3)	12 (38.5)
2012-2015	7 (30.8)	4 (38.5)	10 (23.0)
No. of cohorts (total: 65)	25	13	28
No. of patients (total: 7373)	4145	971	3147

Mantel-Haenszel chi-square test for publications numbers over time, $P = 0.550$.

Table 2: Relationship between reconstruction method and years of publications.

Meta-analysis results

Results of BI and RY

During operation: Eight articles mentioned about operation time and operation bleeding. For operation time, MD = -30.04, 95% CI: -41.73 — -18.35, $P < 0.00001$, $I^2 = 73\%$ (Figure 1a); and for operation bleeding, MD = -6.07, 95% CI: -23.37 — 11.24, $P = 0.490$, $I^2 = 57\%$. Thus, BI had shorter time than RY in operation time; however, result of operation bleeding showed no significant difference between BI and RY.

Postoperative: Three articles reported the flatus time (MD = -0.16, 95% CI: -0.36 — 0.03, $P = 0.090$, $I^2 = 52\%$), showed no significant difference. The results of Meta-analysis for time of first diet (MD = 0.05, 95% CI: -0.19 — 0.29, $P = 0.670$, $I^2 = 44\%$) and postoperative hospital days (MD = -0.70, 95% CI: -2.82 — 1.42, $P = 0.520$, $I^2 = 94\%$) were showed that they had no relationship with reconstruction method.

Among Esophagitis (OR = 1.95, 95% CI: 1.14 — 3.35, $P = 0.010$, $I^2 = 53\%$) (Figure 1b), gastritis (OR = 5.36, 95% CI: 3.30 — 8.69, $P < 0.00001$, $I^2 = 73\%$) (Figure 1c) and bile refluxed (OR= 3.89, 95% CI: 2.15 — 7.05, $P < 0.00001$, $I^2 = 70\%$) Figure 1d), all showed significant differences between BI and RY.

Meanwhile, the Meta result for the total complication (OR = 0.98, 95% CI: 0.50 — 1.91, $P = 0.950$, $I^2 = 63\%$) did not show significant difference. Some researchers viewed a longer surgery time means an increasing rate of infection. While wound infection (OR = 1.19, 95% CI: 0.45 — 3.14, $P = 0.720$, $I^2 = 0\%$) showed no difference between two groups. There is no difference on delayed gastric (OR= 0.51, 95% CI: 0.17 — 1.47, $P = 0.210$, $I^2 = 27\%$) between the two groups.

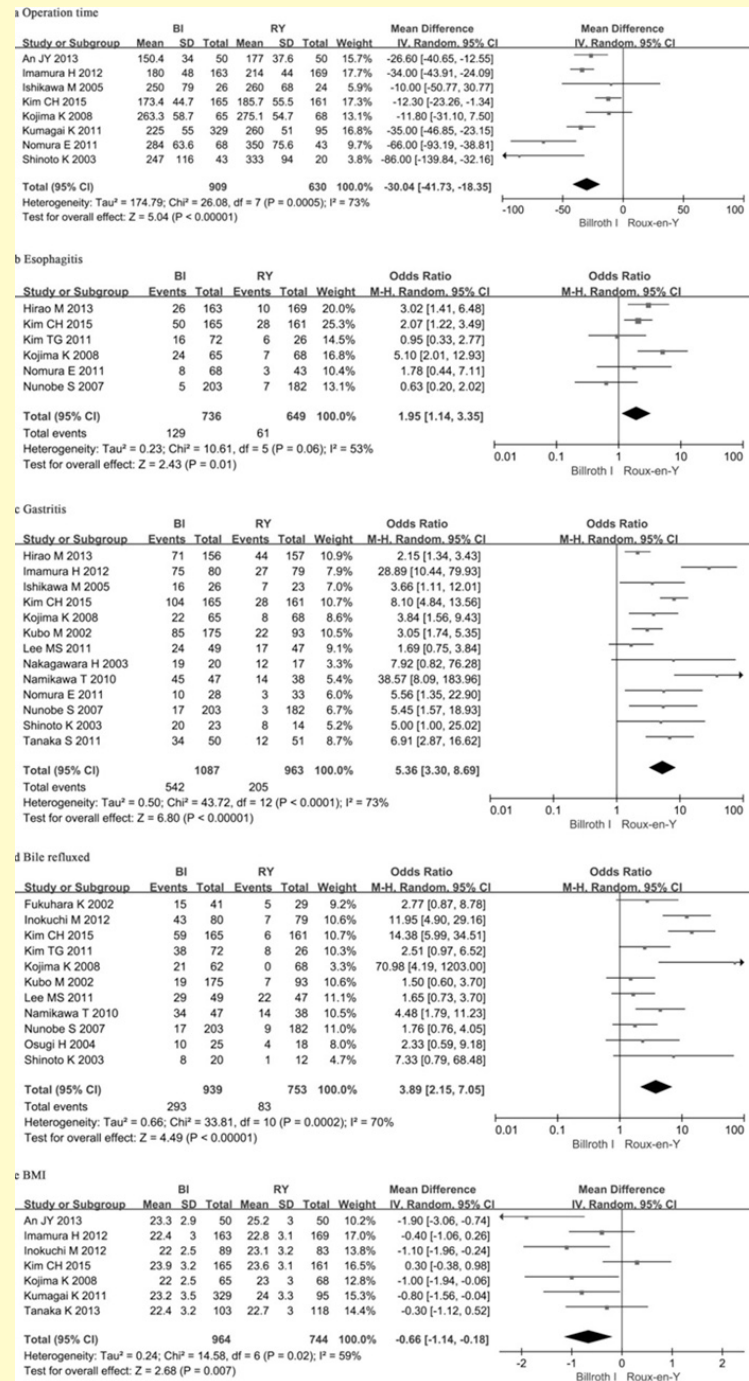


Figure 1: Meta results of BI vs. RY. a Operation time, BI reconstruction method was accomplished in a shorter time than RY (P<0.00001); b Esophagitis, Esophagitis seldom occurred after RY reconstruction than BI (P=0.010); c Gastritis, gastritis was easier to be seen after BI reconstruction than RY (P<0.00001); d Bile refluxed, bile refluxed was a less common complication for RY reconstruction than BI (P<0.00001); e BMI, surgeons were more inclined to perform RY reconstruction on those people who with a bigger BMI (P=0.007).

Six publications analyzed dumping syndrome for the two reconstruction methods, and showed no difference (OR = 1.34, 95% CI: 0.68—2.64, P = 0.390, I² = 49%). Anastomotic leakage (OR = 2.03, 95% CI: 0.34—12.08, P = 0.440, I² = 36%), abdominal bleeding (OR = 1.38, 95% CI: 0.18 — 10.50, P = 0.760, I² = 0%) and mortality (OR = 1.11, 95% CI: 0.04 — 28.15, P = 0.950, I² was not applicable) all showed no difference between the two groups.

Others

Most included articles were retrospective studies, showing different results for preoperational BMI, thus, forest plot was made to certify it, and the Meta-analysis result is, MD = -0.66, 95% CI: -1.14—-0.18, P = 0.007, I² = 59% (Figure 1e). And BI reconstruction seems to be performed on those patients who with smaller BMI.

Results of BI and BII

During operation

Five articles mentioned operation time including 1162 people in BI and 867 in BII, MD = -27.32, 95% CI: -37.70 — -16.95, P < 0.00001, I² = 57% (Figure 2a), showed that BI has shorter time than BII. And operation bleeding (MD = -79.40, 95% CI: -97.95 — -60.85, P < 0.00001, I² = 0%) (Figure 2b) also showed a significant difference between them.

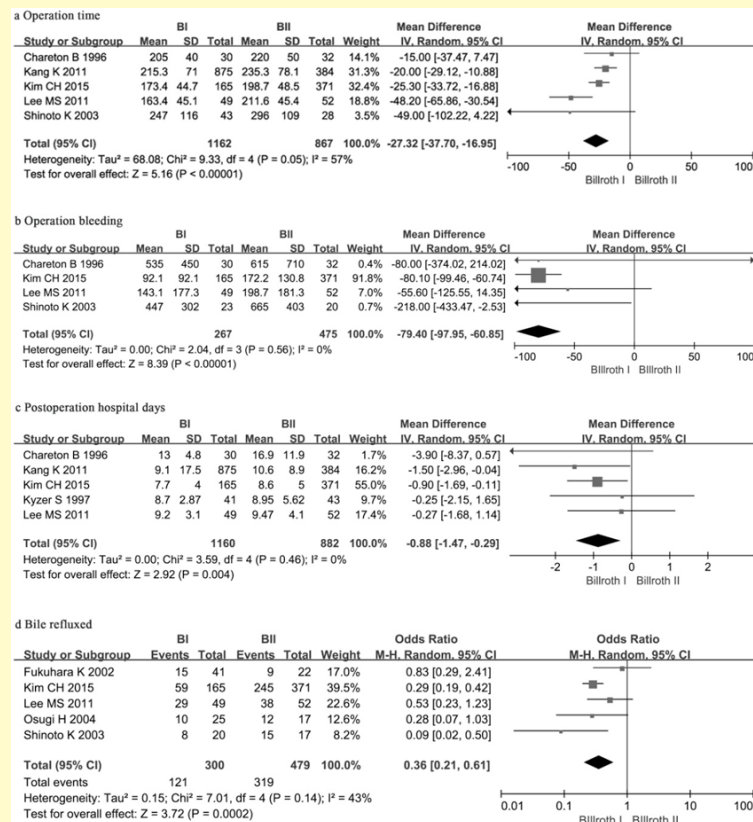


Figure 2: Meta results of BI vs. BII. a Operation time, BI reconstruction method was accomplished in a shorter time than BII (P<0.00001); b Operation bleeding, the operation bleeding of BI reconstruction was less than BII (P<0.00001); c Post-operation hospital days, the hospital days after operation for BI reconstruction is less than BII (P=0.004); d Bile refluxed, bile refluxed was a less common complication for BI reconstruction than BII (P=0.0002).

Postoperative

BI reconstruction didn't show any advantage between flatus time (OR = 0.23, 95% CI: -0.26 — 0.71, P = 0.36, I² = 93%) and time of first diet (MD = -0.02, 95% CI: -0.74 — 0.69, P = 0.950, I² = 92%) than BII reconstruction. However, as to postoperative hospital days (MD = -0.88, 95% CI: -1.47 — 0.29, P = 0.004, I² = 0%) (Figure 2c), it showed a significant difference between the two reconstruction methods.

There was no difference for total complication (OR = 0.64, 95% CI: -0.43 — 0.96, P = 0.03, I² = 52%) between BI and BII. And Meta-analysis result for wound infection (OR = 0.91, 95% CI 0.52 — 1.58, P = 0.73, I² = 0%) showed no difference between the two groups.

The result for bile refluxed (OR = 0.36, 95% CI: 0.21 — 0.61, P = 0.0002, I² = 43%) between BI and BII showed a significant difference (Figure 2d), incidence between esophagitis (OR = 1.12, 95% CI: 0.78 — 1.62, P = 0.550, I² = 0%) and gastritis (OR = 0.53, 95% CI: 0.23 — 1.23, P = 0.140, I² = 57%) showed no difference.

Additionally, Meta-analysis result for dumping syndrome (OR = 0.81, 95% CI: 0.30, — 2.22, P = 0.680, I² = 0%), anastomotic leakage (OR = 0.64, 95% CI: 0.24 — 1.71, P = 0.370, I² = 19%), abdominal bleeding (OR = 0.57, 95% CI 0.16 — 2.04, P = 0.390, I² = 53%) and mortality (OR = 0.56, 95% CI 0.15 — 2.15, P = 0.400, I² = 13%) were all showed no difference between the two groups.

Results of BII and RY

During operation

Most researchers thought BII has shorter operation time than RY, but they didn't make an agreement with Meta-analysis result, MD = -9.11, 95% CI: -24.03 — 5.80, P = 0.230, I² = 82%. And operative bleeding (MD = 24.27, 95% CI: -36.22 — 84.76, P = 0.430, I² = 92%) between the two groups showed no difference.

Postoperative

Result for the time of first diet (MD = 0.76, 95% CI: -0.41 — 1.93, P = 0.200, I² = 97%), postoperative hospital days (MD = 0.47, 95% CI: -2.25 — 3.18, P = 0.730, I² = 94%) and flatus time (MD = 0.28, 95% CI: 0.00 — 0.56, P = 0.050, I² = 63%) all showed no difference between BII and RY.

There was no difference for total complication (OR = 0.85, 95% CI 0.49 — 1.49, P = 0.570, I² = 0%) between two groups, and Meta-analysis result for wound infection (OR = 1.33, 95% CI 0.62 — 2.87, P = 0.46, I² = 0%) showed no relationship with reconstruction method.

Result for esophagitis (OR = 2.02, 95% CI: 1.29 — 3.16, P = 0.002, I² = 0%), gastritis (OR = 11.71, 95% CI: 2.51 — 54.70, P = 0.002, I² = 89%) and bile refluxed (OR = 12.32, 95% CI: 3.60 — 42.14, P < 0.0001, I² = 83%) showed a significant difference between BII and RY, so RY has the less incidence on esophagitis (Figure 3a), gastritis (Figure 3b) and Bile refluxed (Figure 3c).

Meta result on dumping syndrome (OR = 2.29, 95% CI: 0.74 — 7.08, P = 0.150, I² = 0%) showed no difference between two groups. Neither of reconstruction methods would increase the incidence on anastomotic leakage (OR = 1.33, 95% CI: 0.59 — 3.01, P = 0.49, I² = 0%), bleeding (OR = 2.61, 95% CI: 0.64 — 10.67, P = 0.18, I² = 0%) or mortality (OR = 0.95, 95% CI 0.10 — 9.23, P = 0.96, I² = 0%).

Results of BI, BII and RY

As shown in Table 3, RY had least morbidity on esophagitis (BI vs BII, P = 0.550; BII vs RY, P = 0.002; BI vs RY, P = 0.010), gastritis (BI vs BII, P = 0.140; BII vs RY, P = 0.002; BI vs RY, P < 0.00001) and bile refluxed (BI vs BII, P = 0.0002; BII vs RY, P < 0.00001; BI vs RY, P < 0.0001).

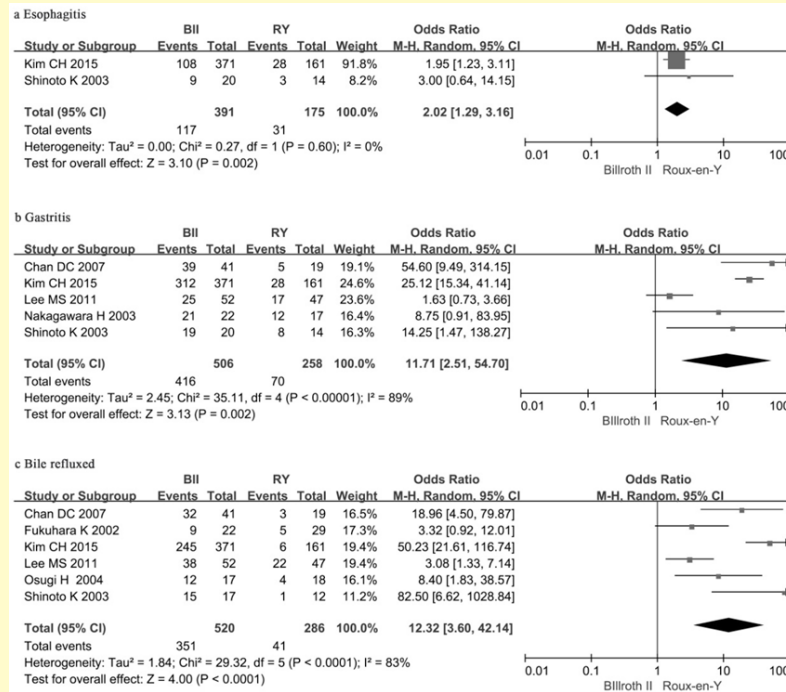


Figure 3: Meta results of BII vs. RY. a Esophagitis, Esophagitis seldom occurred after RY reconstruction than BII (P=0.002); b Gastritis, gastritis was easier to be seen after BII reconstruction than RY (P=0.0002); c Bile refluxed, bile refluxed was a less common complication for RY reconstruction than BII (P<0.0001).

	BI vs BII			BI vs BII		BII vs RY			
	BI	RY	P	BI	BII	P	BII	RY	P
Operation time	909	630	< 0.00001*	1162	867	< 0.00001*	868	600	0.230
Operation bleeding	909	630	0.490	267	475	< 0.00001*	587	364	0.430
Flatus time	544	306	0.090	1130	850	0.360	840	580	0.050
Time of first diet	733	499	0.670	1130	850	0.950	840	580	0.200
Postoperative hospital days	870	593	0.520	1160	882	0.004*	840	580	0.730
Total complication	524	450	0.950	1756	1012	0.030	445	237	0.570
Wound infection	448	415	0.720	1591	662	0.730	469	419	0.460
Abdominal bleeding	707	475	0.760	1756	1033	0.390	557	344	0.180
Dumping syndrome	624	732	0.320	96	71	0.680	39	47	0.150
Esophagitis	736	649	0.010*	218	423	0.550	391	175	0.002*
Gastritis	1087	963	< 0.00001*	257	465	0.140	503	258	0.002*
Bile refluxed	939	753	< 0.00001*	300	479	0.0002*	520	286	< 0.0001*
Anastomotic leakage	846	586	0.440	1797	1055	0.037	840	580	0.490
Delayed gastric	260	257	0.210	—	—	—	—	—	—
Mortality	332	283	0.950	1042	495	0.400	322	272	0.910

* shows a significant difference

Table 3: Meta results for three reconstruction methods.

As the easiest reconstruction method, BI had the shortest operation time (BI vs BII, $P < 0.00001$; BII vs RY, $P = 0.230$; BI vs RY, $P < 0.00001$). Besides, BI showed less coincidence of operation bleeding ($P < 0.00001$) and less postoperative hospital days than BII, however, both of them showed no significant difference between BII vs RY and BI vs RY.

Publication bias

Funnel figures were used to assess our publication bias, all results had been showed little publication bias, however, significant heterogeneity was existed in some of the studies, and we would explain it at the discussion part.

Discussion

According to recent publications, the average survival time of gastric carcinoma has been prolonged in the last twenty years, especially in developing countries. Surgery was considered as the only way may cure gastric carcinoma, and till now, measures have been taken to improve the gastric carcinoma patient's survival time. For example, partial gastrectomy was popularized for early gastric carcinoma [37]; D2 lymph nodes dissection have prolonged the survival time for patients of advanced gastric carcinoma [38-40]; hyperthermic intraperitoneal chemotherapy helped patients to have more confidence on advanced gastric carcinoma [41].

Our results illustrated that RY reconstruction was an effective alternative to BI and BII reconstruction method for gastric carcinoma following distal gastrectomy with the least incidence of gastritis and bile refluxed. The reason was that BI reconstruction has a direct connection with residual gastric and duodenal. It is quite easy for bile flows from duodenal to gastric, and for BII reconstruction, exclusion of duodenal seems solved the problem of a shorter or fixed duodenal, but it also means bile erodes residual gastric easily. BII + Brown reconstruction method was considered to avoid bile refluxed, and should be discussed in our Meta-analysis, but it was showed only in two of all inclusion publications [4,10].

Patients with smaller BMI are tended to be performed BI reconstruction, for longer esophagus or longer duodenal seems more easily to be jointed. However, from the result, BI reconstruction doesn't show any preponderance except the shortest operation time among three reconstruction methods, so BMI was not a factor affecting by the reconstruction method. But limited number of RCT articles might be a factor affecting the result of Meta-analysis, multicenter randomized controlled clinical studies (MRCT) are needed to get the best reconstruction method.

Stomal ulcer, postoperative cholelithiasis, Roux stasis syndrome was regarded as the disadvantage after RY reconstruction [42], however, based on the results, Roux stasis syndrome was showed no significant difference among three reconstruction methods. Additionally, the limited number of articles on stomal ulcer [8,35] and postoperative cholelithiasis [9,22,29] prevents us from conducting the Meta-analysis.

According to recent publications, reconstruction method might affect the duration of diabetes and influence the renal functions [43,44], but they didn't meet an agreement, and what's worse, there are no enough data for us to perform our research on evaluating the relationship between them.

Eight RCTs had been included, one was among BI, BII and RY; five were between BI and RY; and the rest were between the other groups (Table 2). The limited number of RCTs was few enough for us to perform Meta-analysis independently. So RCTs and CCSs were put together to complete our analysis, it might be the most important reason for significant heterogeneity in some of the research parameters, thus MRCT are needed to get the best reconstruction method. Many researchers thought Net Meta-analysis might suit to our analysis. However, only 5 articles compared the difference among BI, BII and RY, what's more, their research subjects are different. Adding other two groups publications on different researching background might make our scientific problems more difficult and increase the significant heterogeneity obviously [45,46].

Our study illustrates parameters of different reconstruction methods during operation and short-term postoperation, but long-term complications (such as recurrences, distant metastases and survival rate) [26,33,35,36] of the patients with different reconstruction methods are rarely reported. Recently, a new reconstruction method which called delta-shaped anastomosis was performed for gastric carcinoma following distal gastrectomy during laparoscopic surgery. Research has been done to compare the delta-shaped anastomosis with other reconstruction methods, but it is still lack of evidence to evaluate this new reconstruction method owing to the limited number of the articles.

More and more minimally invasive surgery was performed, but in our included publications, few articles have mentioned it, which maybe most investigators pay more attention to mini-invasive surgery itself, so whether mini-invasive surgery has relationship with reconstruction method, more researches should be performed in the future.

Conclusion

In conclusion, RY reconstruction method seems to be an effective alternative method to BI and BII reconstruction in less incidence of reflux symptoms for gastric carcinoma following distal gastrectomy, To improve the quality life of the patients of gastric carcinoma, RY reconstruction could be widespread used in operation. Nevertheless, preponderance of evidence indicated BI reconstruction could be performed in the shortest time, so BI reconstruction method could be manipulated in exceptional cases.

Competing interests

The authors declare that they have no competing interests.

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