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DA-CHENG-QI DECOCTION, A TRADITIONAL CHINESE HERBAL FORMULA, FOR INTESTINAL OBSTRUCTION: SYSTEMATIC REVIEW AND META-ANALYSIS

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Abstract

Background: This study was aimed at determining the effects and safety of Da-Cheng-Qi decoction (DCQD) or DCQD combined with conservative therapy in patients with intestinal obstruction.

Materials and Methods: PubMed, EMBASE, Cochrane Controlled Trials Register, and several other databases were searched. Randomised controlled trials (RCTs) of DCQD or DCQD plus conservative therapy in patients with intestinal obstruction were eligible. Therapeutic effect was estimated by the improvement of clinical manifestations and diagnostic imaging; dichotomous/ordinal data assessment of overall response to therapy, adverse effects; or continuous variable were identified, including time to first bowel movement, time to first flatus, length of hospital stay.

Results: Sixty eligible RCTs including 6,095 patients were identified. Response rate: (1) DCQD versus conservative therapy (6 RCTs, 361 patients, RR of respond =1.13; 95% CI 0.97 to 1.31). (2) DCQD plus conservative therapy versus conservative therapy (48 RCTs, 4,916 patients, RR of respond =1.25 which favoured DCQD plus conservative therapy; 95% CI 1.20 to 1.30). Treatment effect remained similar when RCTs at high risk of bias were excluded. Time to first flatus postoperatively: (1) DCQD versus conservative therapy (2 RCTs, 240 patients, SMD=-3.65; 95% CI -8.17 to 0.87). (2) DCQD plus conservative therapy versus conservative therapy (11 RCTs, 1,040 patients, SMD=-2.09 which favoured DCQD plus conservative therapy; 95% CI -3.04 to -1.15).

Conclusion: DCQD combined with conservative therapy may increase the success rate of conservative therapy for intestinal obstruction significantly and can shorten the duration of postoperative ileus in patients undergoing abdominal surgery compared with conservative therapy alone.

Key words: Da-Cheng-Qi-Tang; Intestinal Obstruction; Ileus; Intestinal Pseudo-Obstruction; Meta-Analysis.

Introduction

Intestinal obstruction refers to any impairment, arrest, or reversal of the normal flow of intestinal contents toward the anal canal. It can be classified according to pathogenesis: ileus (a transient impairment of bowel motility caused by operation, inflammation, metabolism, neurogenic reasons and drugs) and mechanical intestinal obstruction (a kind of obstruction caused by any mechanical reasons, such as adhesion, neoplasm or herniation. And it accounts for approximately 15% of all emergency department visits for acute abdominal pain (Williams et al., 2005)). Postoperative ileus and mechanical intestinal obstruction caused by postoperative adhesions are the predominant types respectively.(Moran, 2007; Kumar et al., 2009) For ileus, conservative therapy containing bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics and sometimes cathartics are the main strategies of treatment. As for mechanical intestinal obstruction, surgery is warranted in patients with obstruction when conservative therapy does not resolve within 48 hrs after it initiated (Fevang et al., 2002). Conservative therapy has been shown to be successful in more than 70% of the patients with mechanical intestinal obstruction (Tanaka et al., 2008). However, delay in diagnosis and suitable treatment may cause a substantial increase of complications. The complications of intestinal obstruction include bowel ischemia and perforation, which may lead to severe outcomes or even death. (Markogiannakis et al., 2007) The diagnosis and treatment of intestinal obstruction remains a challenge.

Da-Cheng-Qi decoction (DCQD), Dai-joki-to in Japanese, a classic Chinese herbal formula (Satoh, 2013), is commonly used for the treatment of intestinal obstruction besides modern medicine in Chinese hospitals (Qi et al, 2004). The main components of DCQD are *Radix et Rhizoma*

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Rhei, *Cortex Magnoliae Officinalis*, *Fructus Aurantii Immaturus* and *Natrii Sulfas*. Herbs in formula can sometimes be slightly adjusted (*jiajian* in Chinese pinyin) by doctor's judgments about the patients' clinical manifestations. DCQD can be administered via oral or rectal, and is to be stopped if patients egrets. Though pharmacological studies have shown different positive effects of the single plant extracts in DCQD,(Xu et al., 2010; Tang et al., 2008; Qi et al., 2007; Gong et al., 2011) as a formula, efficacy or side-effects of DCQD has not been systematically assessed till now. Therefore, the objective of the systematic review and meta-analysis is to determine the effects (benefits and harms) of DCQD in the treatment of intestinal obstruction, in mono-therapy or in combination with conservative therapy, as compared to conservative therapy alone.

Methods

Search strategy and study selection.

A search of the medical literature was conducted using PubMed (up to July 2011), EMBASE (1980 to July 2011), Cochrane Controlled Trials Register (issue 7, 2011), Sinomed (up to July 2011), China National Knowledge Infrastructure (CNKI) database (1994 to July 2011), Wanfang Data (1989 to July 2011) and the VIP Information (1990 to July 2011). Randomised Controlled Trials (RCTs) comparing the effects of DCQD or DCQD plus conservative therapy with conservative therapy in adult patients with intestinal obstruction (ileus or mechanical) were eligible for inclusion. Trials using other pharmaco-therapies were eligible, as long as these were administered to both the intervention and control groups. Diagnosis of intestinal obstruction could be based on case history, clinical manifestations and diagnostic imaging (X-ray or computed tomography scan). The primary outcome of this meta-analysis was estimated by the improvement of clinical manifestations (relief of abdominal pain, passage of flatus/stool, bowel movement) and diagnostic imaging (X-ray or computed tomography scan). We attempted to contact the original investigators in order to obtain further information if necessary. Studies on intestinal obstruction were identified with the terms *intestinal obstruction*; *intestinal pseudo-obstruction* and *ileus*, (both as medical subject heading (MeSH) and free text terms), *small bowel obstruction*, *SBO* and *large bowel obstruction* (as free text terms). These were combined using the set operator AND, with studies identified using the terms: *Da-Cheng-Qi-Tang*, *DCQT herbal medicine and Drugs*, *Chinese Herbal* (MeSH terms), *Da-Cheng-Qi decoction* (free text terms). We also searched the reference lists of the original reports, reviews, letters to the editor, case reports and meta-analyses of studies involving Chinese herbal medicine (retrieved through the electronic searches) to identify studies which had not yet been included in the computerised databases, all potentially relevant papers were obtained and evaluated in detail. There were no language restrictions. Articles were independently assessed by two reviewers (YB and XFY) using predesigned eligibility criteria: 1) randomised controlled trials; 2) diagnosis of intestinal obstruction based on case history, clinical manifestations and diagnostic imaging (X-ray or computed tomography scan); 3) interventions: DCQD or DCQD plus conservative therapy compared with conservative therapy (DCQD *jiajian* was allowed); 4) decoction administered via oral and/or rectal; 5) therapeutic effect was estimated by the improvement of clinical manifestations (relief of abdominal pain, passage of flatus/stool, bowel movement) and/or diagnostic imaging (X-ray or computed tomography scan); 6) dichotomous/ordinal data assessment of overall response to therapy, adverse effects; or continuous variable were identified, including time to first flatus, time to first bowel movement, length of hospital stay. Any disagreement between reviewers was resolved by consensus between the two reviewers (YB and XFY), adjudicated with the support of a third reviewer (SHJ).

Outcome assessment

The primary outcome assessed was the obstruction cured or improvement at the end of treatment. Failure to response to therapy was defined as no improvement in clinical manifestations (ileus) or as needing surgical treatment (mechanical). If ordinal data were given to define obstruction improvement, they were transformed into dichotomous data (e.g. if the scale was 1, no improvement (ileus) or needs surgical treatment (mechanical); 2, a little improvement; 3, a moderate amount of improvement; 4, great improvement; the latter 3 descriptors were defined as positive outcomes). Secondary outcomes considered was continuous data defined as time to first flatus.

Data extraction

All data were extracted independently by two reviewers (Y.B. and SHJ) onto a pre-designed form (Microsoft Office Excel 2007; Microsoft Corp, Redmond, Washington, USA). All data extraction was then checked by a third reviewer (ZZ). The following data were extracted for each trial: number of centres; geographical location of the study; study population; sample size; proportion of female patients; criteria used to define

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intestinal obstruction; aetiology (including detailed abdominal operation histories); the route of administration; duration of treatment; concomitant medications allowed; total number of adverse events reported; primary outcome measure used to define clinical manifestations improvement or cure following treatment; duration of follow-up; method used to generate the randomization schedule and conceal allocation. Data were extracted as intention-to-treat analyses, where all drop-outs were assumed to be treatment failures, wherever trial reporting allowed this.

Assessment of risk of bias

Assessment of risk of bias was performed independently by two reviewers (YB and SHJ), with disagreements resolved by discussion. Risk of bias was assessed according to the elaborated CONSORT checklist for herbal interventions (Gagnier et al., 2006, 2006) by recording characteristics of the herbal product, qualitative testing, dosage regimen and quantitative description, method used to generate the randomization schedule and conceal allocation, whether blinding was implemented, what proportion of patients completed follow-up, and whether an intention-to-treat analysis was extractable etc.. 2-properly with detailed description, 1-mentioned but not detailed reported, 0-not mentioned or inappropriate. A trial with a quality score ≤ 18 was considered as a trial at high risk of bias, and a trial with a quality score ≥ 36 was considered as a trial at low risk of bias, the left were at moderate risk of bias.

Data synthesis and statistical analysis

Data were pooled using a random effects model to produce wider confidence intervals and more conservative estimates.(DerSimonian et al., 1986) The impacts of DCQD on dichotomous outcomes were expressed as a relative risk (RR) of response to therapy with intervention compared with control with 95% confident intervals (CIs). The number needed to treat (NNT) with 95% CIs were calculated from the reciprocal of the risk difference of the meta-analysis. Time to first flatus was examined using a standardised mean difference (SMD) with a 95% CI.

Heterogeneity between studies was assessed using the I^2 statistic with a cut-off of > 50% to define a significant degree of heterogeneity. We conducted a pre-specified sensitivity analyses according to the type of intestinal obstruction, risk of bias of identified trials, detailed operation histories, the route of administration and the definition of response to therapy. These were exploratory analyses only, and may explain some of the observed variability, the results, however, should be interpreted with caution.

Review Manager Version 5.0 (The Nordic Cochrane Centre, The Cochrane Collaboration, 2008) and Stata/SE version 10.0 (StataCorp, College Station, Texas, USA), were used to generate forest plots for outcomes with 95% CIs, as well as funnel plots. The latter were assessed for evidence of asymmetry, and possible publication bias or other small study effects were evaluated using the Begg's test. (Begg et al., 1994)

Results

The search strategy initially yielded 752 citations, 109 of which appeared to be relevant to the systematic review and were retrieved for further assessment (Figure 1). Of these, 49 were excluded for various reasons, leaving a total of 60 eligible articles. Seven RCTs compared the effect of DCQD with conservative therapy, 54 compared the effect of DCQD plus conservative therapy with conservative therapy alone. Characteristics of the included trials were shown in supplementary Tables.

DCQD versus conservative therapy

The seven RCTs comparing DCQD with conservative therapy involved a total of 521 patients. Five trials were at moderate and two trials were at high risk of bias according to the modified elaborated CONSORT statement for herbal interventions. The pathogenesis in six RCTs was ileus while it was incomplete mechanical intestinal obstruction in one trial. Dichotomous data could be extracted from six RCTs. There were 24 (13.2%) of 182 patients assigned to DCQD who failed to respond to therapy, compared with 38 (21.2%) of 179 allocated to conservative therapy (RR of respond=1.13; 95% CI 0.97 to 1.31) (Fig 2). There was borderline heterogeneity between studies (I^2=58%), with no statistically significant funnel plot asymmetry (Begg's test, p=1.00) suggesting no evidence of publication bias or other small study effects

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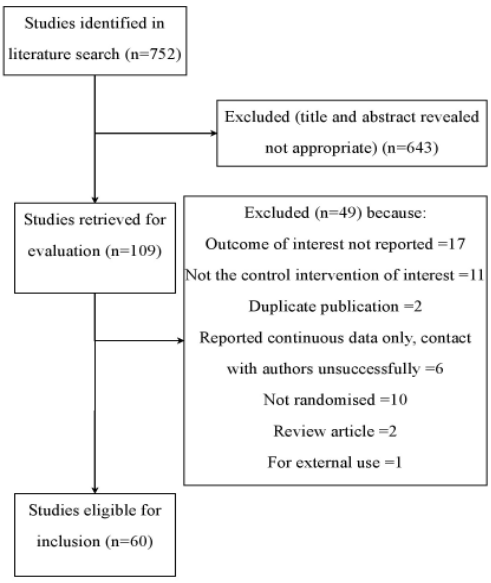

Figure 1: Flow diagram of RCTs included

Table 1: Sensitivity analyses of efficacy of DCQD in intestinal obstruction

	Number of studies	*Number of subjects*	*RR*	*95% CI*	*I^2 value*	*NNT*	*95% CI*
All studies#	6	361	1.13	0.97 to 1.31	58%	N/A	N/A
Risk of bias of trials							
Moderate	5	301	1.14	0.95 to 1.39	66%	N/A	N/A
High	1	60	1.08	0.88 to 1.32	N/A	N/A	N/A
Route of administration							
Via oral	4	231	1.08	0.84 to 1.39	67%	N/A	N/A
Via rectal	2	130	1.22	0.93 to 1.59	70%	N/A	N/A
Definition of response to therapy							
Clinical alone	4	301	1.07	0.91 to 1.25	65%	N/A	N/A
Clinical + Imaging	2	60	1.45	1.11 to 1.91	0%	3.2	2 to 7.7
Aetiology							
Postoperative	3	190	1.15	1.01 to 1.31	35%	7.7	4.2 to 50
Non-postoperative	3	171	1.11	0.72 to 1.73	78%	N/A	N/A

N/A, not applicable; # refers to the studies dichotomous data can be extracted from.

Response to therapy in patients with ileus

The five trials studying ileus reported dichotomous data of 301 patients. Overall, ileus was caused by operation in 190 patients. 21 (13.8%) of 152 patients assigned to DCQD failed to respond to therapy compared with 33 (22.1%) of 149 patients allocated to conservative therapy (RR of respond =1.14; 95% CI 0.95 to 1.39). There was significant heterogeneity between studies (I^2=66%) with no evidence of funnel plot asymmetry (Begg's test, p=0.73). Two RCTs reported continuous data of the time to first flatus post-operatively. There was no statistical difference when results of individual RCTs were combined (SMD=-3.65; 95% CI -8.17 to 0.87) (Figure 3), and there was significant heterogeneity among these two studies (I^2=99%).

Response to therapy in patients with mechanical intestinal obstruction

Only one trial containing 60 patients studied incomplete mechanical intestinal obstruction, 3 (10.0%) of 30 patients assigned to DCQD failed to respond to therapy compared with 5 (16.7%) of 30 patients allocated to conservative therapy (RR of respond =1.08; 95% CI 0.88 to 1.32) (Figure 2).

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Sensitivity analysis

Given the borderline heterogeneity observed when results of individual RCTs were combined, we conducted pre-specified sensitivity analyses (Table 1). The RR of respond was relatively stable in these analyses. Heterogeneity between trials was lower and 95% CI doesn't include the number "1" when only the two studies that used clinical manifestations and imaging improvement to define response to therapy were included in the analysis. Treatment effect remained similar when only the five trials at low risk of bias were considered.

DCQD plus conservative therapy versus conservative therapy

The 54 RCTs comparing DCQD plus conservative therapy with conservative therapy contained a total of 5,574 patients with intestinal obstruction. 27 trials were at moderate and 27 trials were at high risk of bias. Twenty-one RCTs studied ileus while 33 studied mechanical intestinal obstruction. Dichotomous data could be extracted from 48 RCTs. There were 221 (8.4%) of 2,641 patients assigned to DCQD plus conservative therapy who failed to respond to therapy, compared with 648 (28.5%) of 2,275 allocated to conservative therapy alone (RR of respond=1.25; 95% CI 1.20 to 1.30 which favoured DCQD plus conservative therapy), with borderline heterogeneity between studies (I^2=55%) (Fig 4) and an NNT of 5.3 (95% CI 4.8 to 6.3). There was no statistically significant funnel plot asymmetry (Begg's test, p=0.31) suggesting no evidence of publication bias or other small study effects.

Response to therapy in patients with ileus

In the 21 trials studying ileus, 15 reported dichotomous data in 1,168 patients. Overall, ileus of 879 patients was caused by operation. Fifty-one (8.4%) of 606 patients assigned to DCQD plus conservative therapy failed to respond to therapy compared with 150 (26.7%) of 562 patients allocated to conservative therapy (RR of respond =1.23; 95% CI 1.13 to 1.34 which favoured DCQD plus conservative therapy) (Fig 4), with significant heterogeneity between studies (I^2=67%) and an NNT of 5.9 (95% CI 4.3 to 9.1). There was no evidence of funnel plot asymmetry (Begg's test, p=0.19).

Eleven RCTs reported continuous data of time to first flatus post-operatively. There was statistical difference when results of individual RCTs were combined (SMD=-2.09; 95% CI -3.04 to -1.15 which favoured DCQD plus conservative therapy) (Fig 3), and there was significant heterogeneity among studies (I^2=97%).

Table 2: Sensitivity analyses of efficacy of DCQD plus conservative therapy in intestinal obstruction

	Number of studies	*Number of subjects*	*RR*	*95% CI*	*I^2 value*	*NNT*	*95% CI*
All studies#	**48**	**4,916**	**1.25**	**1.20 to 1.30**	**55%**	**5.3**	**4.8 to 6.3**
Risk of bias of trials							
Moderate	**23**	**1,996**	**1.24**	**1.16 to 1.33**	**69%**	**5.6**	**4.5 to 7.7**
High	**25**	**2,920**	**1.26**	**1.21 to 1.31**	**18%**	**5**	**4.3 to 5.9**
Route of administration							
Via oral	**22**	**2,231**	**1.22**	**1.16 to 1.28**	**33%**	**5.9**	**5 to 7.7**
Via rectal	**12**	**1,072**	**1.32**	**1.24 to 1.39**	**0%**	**4.2**	**3.6 to 5.3**
Oral and rectal	**14**	**1,613**	**1.24**	**1.13 to 1.36**	**77%**	**5.6**	**4.2 to 9.1**
Definition of response to therapy							
Clinical alone	**11**	**1,136**	**1.30**	**1.19 to 1.41**	**48%**	**4.8**	**3.7 to 6.3**
Clinical + Imaging	**37**	**3,780**	**1.24**	**1.18 to 1.29**	**55%**	**5.6**	**4.8 to 6.7**
Aetiology							
Postoperative	**35**	**3,724**	**1.22**	**1.17 to 1.27**	**53%**	**5.9**	**5 to 7.1**
Non-postoperative	**13**	**1,192**	**1.34**	**1.24 to 1.45**	**31%**	**4.2**	**3.6 to 5**

refers to the studies dichotomous data can be extracted from

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Supplementary Table 1: Characteristics of the included RCTs (part A)

trials	DOI	definition of intestinal obstruction	aetiology	clinical background	female patients	number of participants	average age	route of DCQD administration	duration of treatment	duration of follow-up
Ao XR 2007	CNKI:SUN:JXZY.0.2007-07-039	diagnostic imaging + clinical manifestations	mechanical	abdominal surgery	44	96	44.4	(nasogastric tube/oral) and rectal	5d	N/A
Cao SB 2008	CNKI:SUN:SXZY.0.2008-09-031	diagnostic imaging + clinical manifestations	ileus	N/A	26	69	71.1	rectal	7d	N/A
Chen CQ 2002	cnki:ISSN:1009-9727.0.2002-03-017	clinical manifestations alone	ileus	stroke	71	180	58.5	nasogastric tube/oral	14d	N/A
Chen H 2009	CNKI:SUN:CZXX.0.2009-04-045	diagnostic imaging + clinical manifestations	mechanical	N/A	24	65	42.24	nasogastric tube/oral	78h	N/A
Chen ZJ 2004	cnki:ISSN:1005-7331.0.2004-02-027	clinical manifestations alone	mechanical	abdominal surgery	15	50	50.8	rectal	5d	N/A
Dong ZC 2008	CNKI:SUN:SXZY.0.2008-05-026	diagnostic imaging + clinical manifestations	mechanical	abdominal surgery	27	68	56.9	(nasogastric tube/oral) and rectal	10d	N/A
Dou WH 2009	CNKI:SUN:SHIX.0.2009-07-019	diagnostic imaging + clinical manifestations	mechanical	abdominal surgery	34	80	41.8	nasogastric tube/oral	10d	N/A
Fan Y 2007	CNKI:ISSN:1003-5699.0.2007-03-019	clinical manifestations alone	mechanical	abdominal surgery	N/A	60	N/A	nasogastric tube/oral	48h	N/A
Fang HL 2008	CNKI:SUN:GAYX.0.2008-04-076	diagnostic imaging + clinical manifestations	mechanical	abdominal surgery	267	538	N/A	(nasogastric tube/oral) and rectal	N/A	N/A
Fu HB 2008	CNKI:SUN:BHON.0.2008-03-026	diagnostic imaging + clinical manifestations	ileus	stroke	27	62	63.5	nasogastric tube/oral	3d	N/A
Gao JC 2005	cnki:ISSN:1000-3649.0.2005-01-017	clinical manifestations alone	ileus	abdominal surgery	12	42	39	nasogastric tube/oral	7d	1y
Gao ZJ 2010	CNKI:SUN:SXZY.0.2010-09-034	diagnostic imaging + clinical manifestations	ileus	abdominal neoplasm or peritonitis	15	60	51.75	nasogastric tube/oral	21d	N/A
He GM 2009	CNKI:SUN:ZDYS.0.2009-21-060	diagnostic imaging + clinical manifestations	mechanical	abdominal surgery	50	97	40.6	nasogastric tube/oral	7d	N/A
Hu ZG	CNKI:SUN:HNZG.0.20	diagnostic imaging +	mecha	N/A	59	126	52.5	(nasogastric	48h	1-5y

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2008	08-04-030	clinical manifestations	nical					tube/oral) and rectal		
Jiang CL 2008	CNKI:SUN:HNZY.0.2008-07-048	diagnostic imaging + clinical manifestations	mechanical	abdominal surgery	58	110	34.6	rectal	N/A	N/A
Jiang K 2009	CNKI:SUN:LZXB.0.2009-04-071	diagnostic imaging + clinical manifestations	ileus	abdominal surgery	23	50	41.5	rectal	N/A	N/A
Li H 2010	CNKI:SUN:GSZY.0.2010-05-015	diagnostic imaging + clinical manifestations	ileus	abdominal surgery	25	56	36.1	nasogastric tube/oral	7d	N/A
Li HS 2004	cnki:ISSN:1004-745X.0.2004-08-022	clinical manifestations alone	mechanical	N/A	50	212	30.9	rectal	48h	6-72m
Li HY 2006	N/A	clinical manifestations alone	ileus	abdominal surgery	160	160	28.5	nasogastric tube/oral	N/A	N/A
Li R 2007	CNKI:ISSN:1006-978X.0.2007-01-010	diagnostic imaging + clinical manifestations	mechanical	abdominal surgery	24	56	41	rectal	15d	N/A
Li ZY 2006	cnki:ISSN:1000-7369.0.2006-01-038	clinical manifestations alone	ileus	abdominal surgery	15	50	48.7	rectal	72h	N/A
Liang QF 2004	cnki:ISSN:0256-7415.0.2004-07-025	diagnostic imaging + clinical manifestations	mechanical	abdominal surgery	29	51	36.9	rectal	3d	N/A
Liang WH 2010	CNKI:SUN:YYXK.0.2010-20-028	diagnostic imaging + clinical manifestations	ileus	abdominal surgery	35	68	41.85	nasogastric tube/oral	7d	N/A
Liao DX 2009	CNKI:SUN:SXLC.0.2009-28-022	diagnostic imaging + clinical manifestations	mechanical	abdominal surgery	52	136	N/A	nasogastric tube/oral	N/A	1m
Liao ZY 2006	cnki:ISSN:1008-2409.0.2006-04-043	clinical manifestations alone	ileus	abdominal surgery	28	80	37.5	rectal	99h	N/A
Liu JS 1996	N/A	clinical manifestations alone	mechanical	abdominal surgery	19	36	32.7	(nasogastric tube/oral) and rectal	N/A	N/A
Liu P 2009	CNKI:SUN:ZGSQ.0.2009-19-173	clinical manifestations alone	ileus	abdominal surgery	N/A	207	N/A	rectal	N/A	0.5-1y
Liu Q 2009	N/A	clinical manifestations alone	ileus	N/A	33	60	53.5	nasogastric tube/oral	N/A	N/A
Liu XH 2005	cnki:ISSN:1003-7705.0.2005-01-009	diagnostic imaging + clinical manifestations	ileus	abdominal surgery	24	50	50.7	rectal	35d	114m

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Lu YH 2008	CNKI:SUN:ZWYY.0.2008-07-050	diagnostic imaging + clinical manifestations	mechanical	N/A	44	96	50	nasogastric tube/oral	7d	N/A
Luo M 2005	cnki:ISSN:1007-6948.0.2005-01-011	clinical manifestations alone	ileus	abdominal surgery	41	97	40.4	rectal	N/A	1-1.5y
Ma ZJ 2005	cnki:ISSN:0256-7415.0.2005-07-015	clinical manifestations alone	ileus	fracture thoracic vertebrae or lumbar vertebrae	20	60	N/A	nasogastric tube/oral	6d	N/A
Peng T 2010	CNKI:SUN:YXSS.0.2010-09-244	diagnostic imaging + clinical manifestations	mechanical	abdominal surgery	35	116	42.4	nasogastric tube/oral	7d	N/A
Qiu JF 2009	CNKI:SUN:XXYY.0.2009-06-049	clinical manifestations alone	ileus	abdominal surgery	21	60	51.7	nasogastric tube/oral	N/A	N/A
Shen JQ 2005	cnki:ISSN:1005-4561.0.2005-10-005	diagnostic imaging + clinical manifestations	ileus	abdominal surgery, gastrointestinal neoplasm	20	56	34.8	(nasogastric tube/oral) and rectal	18d	N/A
Su SH 2008	CNKI:SUN:QKYX.0.2008-22-032	diagnostic imaging + clinical manifestations	ileus	N/A	6	15	N/A	nasogastric tube/oral	7d	N/A
Sui J 2010	CNKI:SUN:SYYZ.0.2010-12-078	diagnostic imaging + clinical manifestations	mechanical	N/A	43	108	51.2	(nasogastric tube/oral) and rectal	7d	N/A
Sun JJ 2006	cnki:ISSN:1000-7369.0.2006-01-037	clinical manifestations alone	ileus	abdominal surgery	155	302	67.8	nasogastric tube/oral	N/A	N/A
Tang ZA 2008	CNKI:SUN:SYLC.0.2008-11-065	diagnostic imaging + clinical manifestations	mechanical	abdominal surgery	21	60	41.5	(nasogastric tube/oral) and rectal	10d	N/A
Tao YJ 2008	CNKI:SUN:XDJH.0.2008-21-058	diagnostic imaging + clinical manifestations	mechanical	abdominal surgery	64	170	46.1	nasogastric tube/oral	4d	N/A
Tong FG 2006	N/A	clinical manifestations alone	mechanical	N/A	22	64	N/A	nasogastric tube/oral	3d	N/A
Wang CG 2010	CNKI:SUN:JYGZ.0.2010-02-032	diagnostic imaging + clinical manifestations	ileus	abdominal surgery	15	38	31.7	(nasogastric tube/oral) and rectal	10d	N/A
Wang CH 2009	CNKI:SUN:HNZY.0.2009-06-017	clinical manifestations alone	ileus	abdominal surgery	150	150	44.8	nasogastric tube/oral	2d	N/A
Wang P 2007	CNKI:ISSN:1004-0501.0.2007-05-042	diagnostic imaging + clinical manifestations	mechanical	tuberculous peritonitis	36	65	38.6	rectal	72h	N/A
Wang W	cnki:ISSN:1671-4040.0.	diagnostic imaging +	mecha	abdominal surgery	56	162	N/A	nasogastric tube/oral	N/A	N/A

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2004	2004-03-014	clinical manifestations	nical							
Wang YF 2009	CNKI:SUN:PTGZ.0.2009-05-009	diagnostic imaging + clinical manifestations	mecha nical	abdominal surgery	70	127	49	nasogastric tube/oral	N/A	N/A
Wen JY 2008	CNKI:SUN:ZWYY.0.2008-05-038	diagnostic imaging + clinical manifestations	ileus	abdominal surgery	13	32	40.2	rectal	N/A	N/A
Wu CT 2003	cnki:ISSN:1001-5426.0.2003-02-011	diagnostic imaging + clinical manifestations	mecha nical	abdominal surgery	58	248	40.9	nasogastric tube/oral	24h	N/A
Wu DH 2009	CNKI:SUN:FJZY.0.2009-06-030	clinical manifestations alone	mecha nical	abdominal surgery	20	52	51.5	rectal	7d	N/A
Xie ZC 2008	CNKI:SUN:YLQY.0.2008-06-061	diagnostic imaging + clinical manifestations	mecha nical	abdominal surgery	59	125	37.5	rectal	N/A	N/A
Xu HY 2009	CNKI:SUN:MZMJ.0.2009-20-045	diagnostic imaging + clinical manifestations	ileus	abdominal surgery	25	80	63.9	nasogastric tube/oral	10d	N/A
Yang SZ 2010	CNKI:SUN:JLYX.0.2010-31-027	clinical manifestations alone	ileus	abdominal surgery	14	42	53.6	(nasogastric tube/oral) and rectal	N/A	N/A
Ye B 2008	N/A	diagnostic imaging + clinical manifestations	mecha nical	abdominal surgery	43	70	N/A	(nasogastric tube/oral) and rectal	5d	N/A
You L 2008	CNKI:SUN:SJZX.0.2008-04-025	clinical manifestations alone	mecha nical	phytobezoar induced obstruction	35	96	37.3	nasogastric tube/oral	3d	N/A
Zhang Y 2007	CNKI:ISSN:0256-7415.0.2007-01-006	diagnostic imaging + clinical manifestations	mecha nical	abdominal surgery	41	97	38.8	(nasogastric tube/oral) and rectal	5d	N/A
Zhao Y 2006	cnki:ISSN:0256-7415.0.2006-03-029	diagnostic imaging + clinical manifestations	mecha nical	abdominal surgery	44	117	43.9	(nasogastric tube/oral) and rectal	3-5d	N/A
Zhao YL 2006	N/A	clinical manifestations alone	ileus	abdominal surgery	82	162	46.1	nasogastric tube/oral	N/A	N/A
Zheng HL 2010	CNKI:SUN:GDYY.0.2010-04-071	diagnostic imaging + clinical manifestations	mecha nical	abdominal surgery	40	100	46.5	(nasogastric tube/oral) and rectal	72h	N/A
Zhou SY 2009	CNKI:SUN:GYZX.0.2009-04-022	diagnostic imaging + clinical manifestations	mecha nical	abdominal surgery	40	86	44.5	(nasogastric tube/oral) and rectal	24h	N/A
Zhou YJ 2001	cnki:ISSN:1004-745X.0.2001-06-016	diagnostic imaging + clinical manifestations	mecha nical	abdominal surgery	16	78	45.8	(nasogastric tube/oral) and rectal	N/A	N/A

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Supplementary Table 2: Characteristics of the included RCTs (part B)

Trials	Interventions (experimental group)	Interventions (control group)	Outcomes
Ao XR 2007	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, laxatives (liquid paraffin), soapsuds enema, DCQD *jiajian*	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, laxatives (liquid paraffin), soapsuds enema	improvement of clinical/imaging manifestations
Cao SB 2008	bowel rest, intubation and decompression, intravenous fluid resuscitation, DCQD *jiajian*	bowel rest, intubation and decompression, intravenous fluid resuscitation	improvement of clinical/imaging manifestations
Chen CQ 2002#	1) DCQD *jiajian* 2) cisapride 3*10mg/d, DCQD *jiajian*	cisapride 3*10mg/d	time to first stool, length of hospital stay
Chen H 2009	bowel rest, intubation and decompression, intravenous fluid resuscitation, DCQD *jiajian* 50mL/6h	bowel rest, intubation and decompression, intravenous fluid resuscitation antibiotics	time to first flatus, time to clinical/imaging manifestations improved, time to extubation, length of hospital stay
Chen ZJ 2004	bowel rest, decompression, antibiotics, intravenous fluid resuscitation, DCQD 200ml/12h	bowel rest, decompression, antibiotics, intravenous fluid resuscitation	time to first stool, improvement of clinical manifestations
Dong ZC 2008	bowel rest, decompression, intravenous fluid resuscitation, DCQD 175ml/12h, antibiotics	bowel rest, decompression, intravenous fluid resuscitation, soapsuds enema	improvement of clinical/imaging manifestations
Dou WH 2009	bowel rest, decompression, antacid, intravenous fluid resuscitation, antibiotics, DCQD 200ml/24h	bowel rest, decompression, antacid, intravenous fluid resuscitation, antibiotics	improvement of clinical/imaging manifestations
Fan Y 2007	DCQD 200ml/24h	cisapride 3*5mg/d	time to first bowel movement, improvement of clinical manifestations
Fang HL 2008	bowel rest, decompression, intravenous fluid resuscitation, antibiotics, DCQD 200-300ml/24h	bowel rest, decompression, intravenous fluid resuscitation, antibiotics	time to first stool, improvement of clinical/imaging manifestations
Fu HB 2008	bowel rest, decompression, intravenous fluid resuscitation, antibiotics, DCQD 200ml/24h	bowel rest, decompression, intravenous fluid resuscitation, antibiotics	time to first stool, improvement of clinical/imaging manifestations
Gao JC 2005	decompression, intravenous fluid resuscitation, antibiotics, DCQD	decompression, intravenous fluid resuscitation, antibiotics	time to first flatus, improvement of clinical manifestations
Gao ZJ 2010	bowel rest, intubation and decompression, intravenous fluid resuscitation, total parenteral nutrition, glucocorticoids, antibiotics, DCQD *jiajian* 100ml/12h, metoclopramide 10mg	bowel rest, intubation and decompression, intravenous fluid resuscitation, total parenteral nutrition, glucocorticoids, antibiotics	improvement of clinical/imaging manifestations, length of hospital stay
He GM 2009	bowel rest, intubation and decompression, intravenous fluid resuscitation, total parenteral nutrition, glucocorticoids, antibiotics, DCQD *jiajian*	bowel rest, intubation and decompression, intravenous fluid resuscitation, total parenteral nutrition,	improvement of clinical/imaging manifestations, length of hospital stay

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	200ml/24h	glucocorticoids, antibiotics	
Hu ZG 2008	bowel rest, intubation and decompression, intravenous fluid resuscitation, total parenteral nutrition, coloclysis with physiological saline, DCQT *jiajian*	bowel rest, intubation and decompression, intravenous fluid resuscitation, total parenteral nutrition, coloclysis with physiological saline	improvement of clinical/imaging manifestations
Jiang CL 2008	bowel rest, intubation and decompression, intravenous fluid resuscitation, total parenteral nutrition, antibiotics, coloclysis with 200ml DCQT *jiajian*(twice/day)	bowel rest, intubation and decompression, intravenous fluid resuscitation, total parenteral nutrition, antibiotics, coloclysis with 200ml physiologic saline (twice/day)	improvement of clinical/imaging manifestations
Jiang K 2009	bowel rest, intubation and decompression, intravenous fluid resuscitation, somatostatin, histamine 2 blocking pharmacon, glucocorticoids, DCQD *jiajian*	bowel rest, intubation and decompression, intravenous fluid resuscitation, somatostatin, histamine 2 blocking pharmacon, glucocorticoids	improvement of clinical/imaging manifestations
Li H 2010	bowel rest, intubation and decompression, intravenous fluid resuscitation, proton pump inhibitor, glucocorticoids, antibiotics, diuretic, DCQD *jiajian*	bowel rest, intubation and decompression, intravenous fluid resuscitation, proton pump inhibitor, glucocorticoids, antibiotics, diuretic	improvement of clinical/imaging manifestations, time to first flatus, time to first bowel movement, time to first stool, the duration of treatment
Li HS 2004	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, DCQD *jiajian* 100ml(2 times/day),	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics	time to first stool, improvement of clinical manifestations
Li HY 2006	DCQD *jiajian*	bowel rest, intubation and decompression, intravenous fluid resuscitation	time to first flatus
Li R 2007	bowel rest, intubation and decompression, intravenous fluid resuscitation, somatostatin, histamine 2 blocking pharmacon, antibiotics, DCQD *jiajian*	bowel rest, intubation and decompression, intravenous fluid resuscitation, somatostatin, histamine 2 blocking pharmacon, antibiotics	improvement of clinical/imaging manifestations, length of hospital stay
Li ZY 2006	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, DCQD 200ml (twice/day)	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics	time to first flatus, time to first stool, the gastrin level change, the vascular intestinal peptide(VIP) level
Liang QF 2004	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, DCQD *jiajian* 200ml (twice/day)	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics	improvement of clinical/imaging manifestations
Liang WH 2010	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, glucocorticoids, somatostatin, DCQD *jiajian*	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, glucocorticoids, somatostatin	time to first flatus, time to first stool, time to clinical/imaging manifestations improved, time to imaging improvement
Liao DX 2009	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, somatostatin, acupuncture moxibustion, DCQD *jiajian*, change position continuously	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, somatostatin, change position continuously	improvement of clinical/imaging manifestations
Liao ZY 2006	intubation and decompression, intravenous fluid resuscitation, antibiotics,	intubation and decompression, intravenous fluid	improvement of clinical manifestations, time to first

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	DCQD	resuscitation, antibiotics, coloclysis with glycerol	flatus, time to first stool, time to clinical manifestations improved
Liu JS 1996	intubation and decompression, intravenous fluid resuscitation, antibiotics, DCQD	intubation and decompression, intravenous fluid resuscitation, antibiotics	time to first flatus, time to first stool, time to recovery of body temperature, length of hospital stay, complications
Liu P 2009	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, vitamin B1, DCQD	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, vitamin B1	improvement of clinical manifestations
Liu Q 2009	antibiotics, DCQD	intubation and decompression, intravenous fluid resuscitation, antibiotics	improvement of clinical manifestations
Liu XH 2005	bowel rest, intravenous fluid resuscitation, intubation and decompression, antibiotics, glucocorticoids, DCQD *jiajian*	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, laxatives (glycerol, liquid paraffin or castor oil)	improvement of clinical/imaging manifestations
Lu YH 2008	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, DCQD	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics	improvement of clinical/imaging manifestations
Luo M 2005	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, DCQD	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics	first bowel movement, time to first flatus, time to first stool
Ma ZJ 2005	intravenous fluid resuscitation, DCQD *jiajian*	intubation and decompression, laxative(glycerine enema or folium sennae), intravenous fluid resuscitation	improvement of clinical manifestations
Peng T 2010	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, somatostatin, DCQD *jiajian*	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, somatostatin	response rate, time to clinical/imaging manifestations improved
Qiu JF 2009	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, DCQD *jiajian* 50ml/12h	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, physiological saline 50ml/12h	time to first stool
Shen JQ 2005	intubation and decompression, intravenous fluid resuscitation, antibiotics, glucocorticoids, omatostatin, CQD *jiajian* 200ml/d	intubation and decompression, intravenous fluid resuscitation, antibiotics, glucocorticoids, somatostatin	improvement of clinical/imaging manifestations, time to relief of symptome
Su SH 2008	DCQD *jiajian*(100ml/12h)	primperan 2*10mg/d and mosapride 3*5mg/d	improvement of clinical/imaging manifestations, time to bowel open
Sui J 2010	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, somatostatin, DCQD *jiajian*	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, somatostatin	improvement of clinical/imaging manifestations
Sun JJ 2006	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, DCQD *jiajian* 100ml/12h	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics	improvement of clinical manifestations, incidence of complications
Tang ZA 2008	bowel rest, intubation and decompression, intravenous fluid resuscitation,	bowel rest, intubation and decompression, intravenous	improvement of clinical manifestations

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	antibiotics, DCQD *jiajian*	fluid resuscitation, antibiotics	
Tao YJ 2008	bowel rest, intubation and decompression, intravenous fluid resuscitation, DCQD *jiajian*	bowel rest, intubation and decompression, intravenous fluid resuscitation	improvement of clinical/imaging manifestations
Tong FG 2006	bowel rest, intubation and decompression, intravenous fluid resuscitation, DCQD *jiajian*	bowel rest, intubation and decompression, intravenous fluid resuscitation, liquid paraffin	improvement of clinical manifestations
Wang CG 2010	analgesia, somatostatin, proton pump inhibitors, antibiotics, glucocorticoids (dexamethasone), DCQD *jiajian*	analgesia, somatostatin, proton pump inhibitors, antibiotics, glucocorticoids (dexamethasone)	improvement of clinical/imaging manifestations
Wang CH 2009	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, somatostatin, proton pump inhibitors, DCQD *jiajian* 100ml/12h	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, somatostatin, proton pump inhibitors	improvement of clinical manifestations
Wang P 2007	anti-tuberculosis, bowel rest, intubation and decompression, intravenous fluid resuscitation, DCQD *jiajian*	anti-tuberculosis, bowel rest, intubation and decompression, intravenous fluid resuscitation	improvement of clinical/imaging manifestations
Wang W 2004	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, DCQD *jiajian*	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics	improvement of clinical/imaging manifestations
Wang YF 2009	bowel rest, intubation and decompression, intravenous fluid resuscitation, sandostatin, omeprazole, DCQD	bowel rest, intubation and decompression, intravenous fluid resuscitation, sandostatin, omeprazole	improvement of clinical/imaging manifestations, time to first flatus/stool, time to relief of abdominal pain, time to first bowel movement, time to improvement of imaging manifestations
Wen JY 2008	intubation and decompression, intravenous fluid resuscitation, antibiotics, DCQD *jiajian*	intubation and decompression, intravenous fluid resuscitation, antibiotics	improvement of clinical/imaging manifestations
Wu CT 2003	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, DCQD	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics	time to first stool, improvement of clinical/imaging manifestations
Wu DH 2009	intubation and decompression, intravenous fluid resuscitation, antibiotics, analgesia, DCQD	intubation and decompression, intravenous fluid resuscitation, antibiotics, analgesia	improvement of clinical manifestations
Xie ZC 2008	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, DCQD	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics	improvement of clinical/imaging manifestations
Xu HY 2009	bowel rest, intubation and decompression, intravenous fluid resuscitation, octreotide, ranitidine, dexamethasone, diuretics, antibiotics, DCQD *jiajian*	bowel rest, intubation and decompression, intravenous fluid resuscitation, octreotide, ranitidine, dexamethasone, diuretics, antibiotics	time to first flatus, time to first bowel movement, time to relief of symptom, improvement of clinical/imaging manifestations
Yang SZ 2010	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, DCQD *jiajian*	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics	time to first flatus

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Ye B 2008	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, DCQD *jiajian*	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics	improvement of clinical/imaging manifestations
You L 2008	bowel rest, intubation and decompression, intravenous fluid resuscitation, soapsuds enema, antibiotics, DCQD *jiajian*, electro acupuncture	bowel rest, intubation and decompression, intravenous fluid resuscitation, soapsuds enema, antibiotics	length of hospital stay, improvement of clinical manifestations
Zhang Y 2007	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, DCQD *jiajian*	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics	improvement of clinical/imaging manifestations
Zhao Y 2006	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, CQD *jiajian*	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics	improvement of clinical/imaging manifestations
Zhao YL 2006	DCQD *jiajian*	intubation and decompression, intravenous fluid resuscitation, antibiotics	time to first flatus, time to first stool
Zheng HL 2010	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics, DCQD *jiajian*	bowel rest, intubation and decompression, intravenous fluid resuscitation, antibiotics	improvement of clinical/imaging manifestations
Zhou SY 2009	bowel rest, intubation and decompression, laxatives (liquid paraffin), intravenous fluid resuscitation, antibiotics, DCQD *jiajian*	bowel rest, intubation and decompression, laxatives (liquid paraffin), intravenous fluid resuscitation, antibiotics	improvement of clinical/imaging manifestations
Zhou YJ 2001	bowel rest, intubation and decompression, intravenous fluid resuscitation, DCQD *jiajian*	bowel rest, intubation and decompression, intravenous fluid resuscitation	improvement of clinical/imaging manifestations

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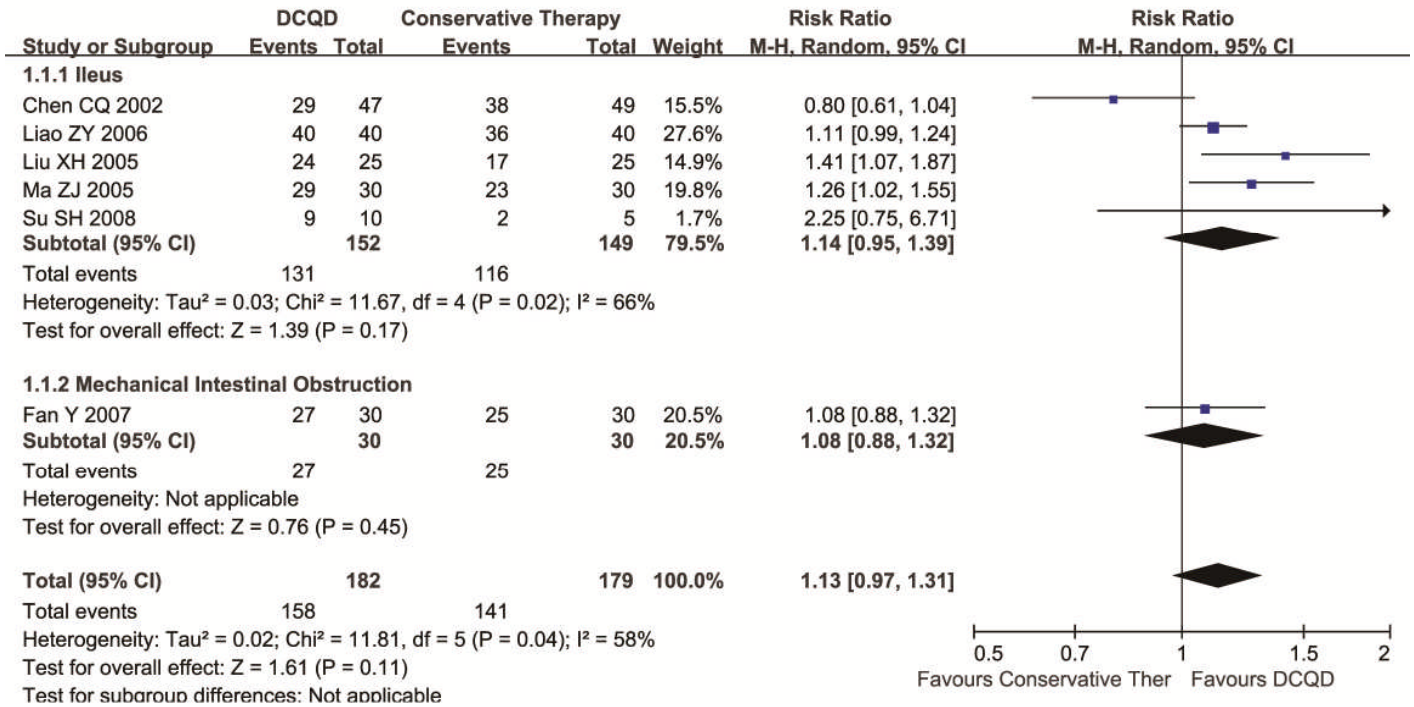

Figure 2: Effect of DCQD compared with conservative therapy in treatment of intestinal obstruction

DCQD, Da-Cheng-Qi decoction; 95% CI, 95% confidence interval

Note that Risk Ratio < 1 means numerically lower response rate than control group and RR > 1 numerically higher response rate than control group. 95% CI doesn't include the number 1 means statistical difference between the 2 groups.

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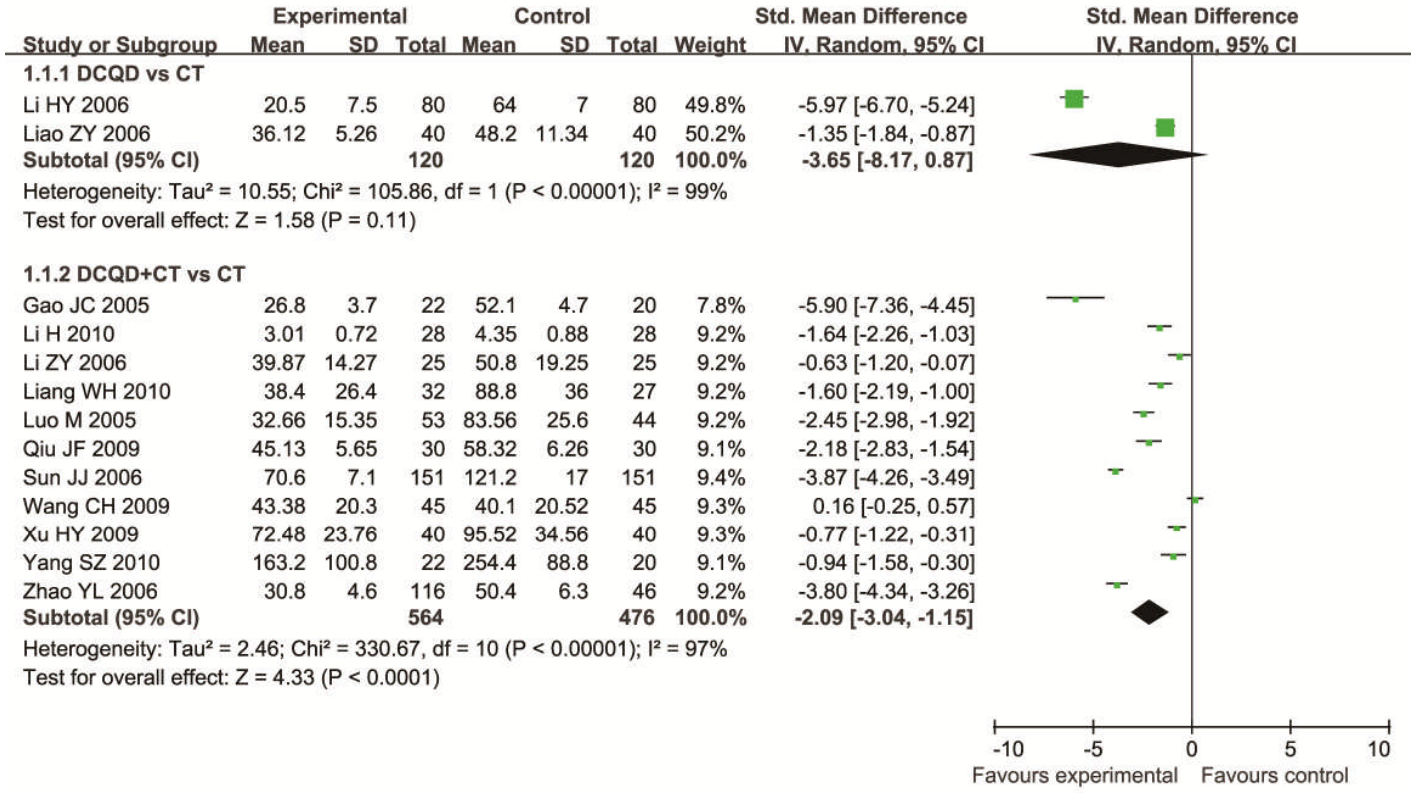

Figure 3: Forest plot of the time to first flatus

SMD, standardised mean difference; 95% CI, 95% confidence interval

Note that SMD < 0 means numerically time to first flatus in experiment group is shorter than control group and SMD > 0 numerically time to first flatus in experimental group is longer than control group. 95% CI doesn't include the number 0 means statistical difference between the 2 groups

Response to therapy in patients with mechanical intestinal obstruction

The 33 RCTs studying mechanical intestinal obstruction reported dichotomous data of 3,748 patients. Mechanical intestinal obstruction of 2,845 patients was caused by postoperative adhesion. Overall, 170 (8.4%) of 2,035 patients assigned to DCQD plus conservative therapy failed to respond to therapy compared with 498 (29.1%) of 1,713 patients allocated to conservative therapy (RR of respond =1.26; 95% CI 1.21 to 1.31 which favoured DCQD plus conservative therapy) (Fig 4), with no significant heterogeneity between studies (I^2=38%) and an NNT of 5.3 (95% CI 4.5 to 5.9). There was no evidence of funnel plot asymmetry (Begg's test, p=0.05).

Given the borderline heterogeneity observed when results of individual RCTs were combined, we conducted pre-specified sensitivity analyses (Table 2). The RR of respond was relatively stable in all these analyses. Heterogeneity between trials was lower when only the 22 studies that administrate DCQD via oral or when only the 12 studies that via rectal were included in the analysis. In addition, the results of sensitivity analyses showed that DCQD administration via rectal seems to be more effective (NNT =4.2 95% CI 3.6 to 5.3). Treatment effect remained similar when only the 23 trials at moderate risk of bias were considered.

Discussion

This systematic review and meta-analysis has demonstrated that DCQD plus conservative therapy were more effective than conservative therapy alone for the treatment of intestinal obstruction, these beneficial effects appeared to exist for both ileus and mechanical intestinal obstruction. In addition, DCQD administration via rectal seems to be more effective. The RR of respond was relatively stable in all the sensitivity analyses. There was no statistical difference when we compared DCQD mono-therapy with conservative therapy alone. Although DCQD appear to be more effective than conservative therapy when the only two studies using clinical manifestations and imaging test improvement to define

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response to treatment, considering there are only 60 subjects left in these two trials, we could draw no conclusion safely. For the continuous data of the time to first flatus, we found that DCQD plus conservative therapy could significantly shorten the duration of postoperative ileus in patients undergoing abdominal surgery.

Pharmacological studies and animal experiments have proved that effective components in DCQD could prevent intestinal adhesion by reducing the concentration of fibrinogen and raising that of fibrin degrading products in the intro-abdominal exudates after major abdominal surgery (Wang et al., 2004), and rhubarb in *Radix et Rhizoma Rhei* effects on colon (Jin et al, 2013) and increases the tension of it. Emodin can enhance the function of small intestinal peristalsis by mechanisms of promoting secretion of motilin, lowering the content of somatostatin and inhibiting sodium-potassium-exchanging ATPase activity of small intestinal mucosa (Zhang et al., 2005). Results of our research corroborated these previous pharmacological studies and animal experiments from another angle.

This systematic review has several strengths. To our knowledge, this is the first meta-analysis that focuses on the efficacy and safety of DCQD in the treatment of intestinal obstruction. The systematic review includes 60 RCTs with 6,095 patients, which makes it a powerful systematic review to analyze the efficacy and safety of DCQD. The study population well represented the general intestinal obstruction population in terms of age and pathogenesis. The success rate of conservative therapy alone was near to the previous study reported (Tanaka et al., 2008). We were also rigorous in describing our search strategy, eligibility criteria, and data extraction processes in detail. We conducted subgroup analysis to maintain clinical homogeneity in the patients, and sensitivity analyses according to risk of bias of included trials, route of administration, definition of response to therapy and aetiology to assess whether any of these trial characteristics affected overall efficacy. We used an intention-to-treat analysis, where all drop-outs assumed to be treatment failures, and pooled data with a random effects model, in order to reduce the likelihood that any beneficial effect of DCQD in intestinal obstruction has been overestimated.

Limitations of the present study, as with any systematic review and meta-analysis, arise from the quality and reporting of the RCTs included. Methodologies of RCTs conducted in mainland China where various and some of the included RCTs did not report their results according to the CONSORT checklist strictly. Blinding and allocation concealment were not reported in these RCTs, which means potential risk of bias. (Wood et al., 2008; He et al., 2011). There was borderline heterogeneity when dichotomous data were pooled, but our sensitivity analyses revealed plausible explanations for this. As for the significant heterogeneity when continuous data were pooled, the potential reasons may be the trials were carried out by surgeons with different technical levels, and clinical background was various among the subjects included, thus clinical heterogeneity inevitably existed. To perform subgroup analysis according to the type of surgical approach and the type of anaesthesia was meaningful, but we could not do this because little trials reported results separately by detailed clinical backgrounds. However, this problem did not prevent us from making a positive conclusion as other systematic reviews did.(Ford et al., 2009; Ford et al., 2011). Total adverse events data for DCQD via oral or rectal were sparse, this, however, may because the side-effects of short-term use of DCQD were light (Zhang et al., 2008;

Maxion-Bergemann et al., 2006; Kaszkin-Bettag et al., 2008) and easily be overwhelmed by the primary diseases. Lack of long-term follow-up prevented us from analysing the recurrence rate of intestinal obstruction.(Fevang et al., 2004) As limitations stated here, future well designed; randomised; double-blind; multicentre; long-term follow-up studies are needed to investigate these unanswered questions.

In summary, current guidelines for the management of intestinal obstruction from national and international do not pay much attention to any kinds of complementary and alternative medicine,(Diaz et al., 2008; Catena et al., 2011) evidence from this systematic review and meta-analysis supports the use of DCQD plus conservative therapy, which may increase the success rate of conservative therapy significantly and shorten the duration of postoperative ileus in patients undergoing abdominal surgery.

Contributors: Ling Tang acts as guarantor for the validity of the study report. Study concept and design: TL, LCQ. Acquisition of data: YB, XFY. Data Check: SHJ. Analysis and interpretation of data: YB, SHJ. Draft of manuscript: XFY, SXY. Critical revision of the manuscript for important intellectual content: ZZ, SXY. Statistical analysis: YB, XFY, SHJ.

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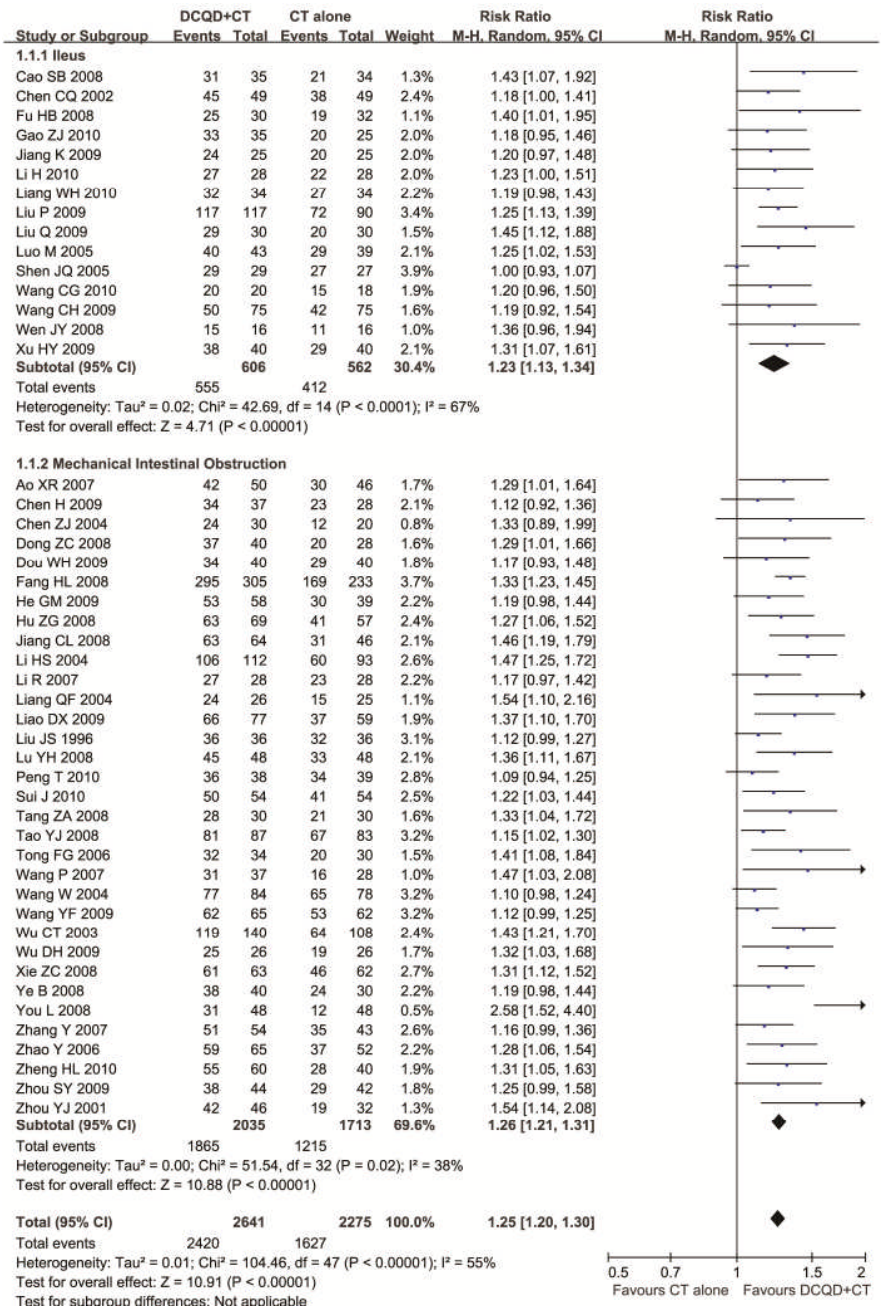

Figure 4: Effect of DCQD plus conservative therapy compared with conservative therapy in treatment of intestinal obstruction

CT, conservative therapy; DCQD, Da-Cheng-Qi decoction; 95% CI, 95% confidence interval

Note that RR < 1 means numerically lower response rate than control group and RR > 1 numerically higher response rate than control group. 95% CI doesn't include the number 1 means statistical difference between the 2 groups.

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