World Journal of Gastrointestinal Surgery

World J Gastrointest Surg 2024 July 27; 16(7): 1956-2364





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World Journal of Gastrointestinal Surgery

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Peer Reviewer of World Journal of Gastrointestinal Surgery, Hideki Aoki, MD, PhD, Chief Doctor, Surgeon, Department of Surgery, Iwakuni Clinical Center, Iwakuni 740-8510, Japan. aoki.hideki.hy@mail.hosp.go.jp

AIMS AND SCOPE

The primary aim of World Journal of Gastrointestinal Surgery (WJGS, World J Gastrointest Surg) is to provide scholars and readers from various fields of gastrointestinal surgery with a platform to publish high-quality basic and clinical research articles and communicate their research findings online.

WJGS mainly publishes articles reporting research results and findings obtained in the field of gastrointestinal surgery and covering a wide range of topics including biliary tract surgical procedures, biliopancreatic diversion, colectomy, esophagectomy, esophagostomy, pancreas transplantation, and pancreatectomy, etc.

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RESPONSIBLE EDITORS FOR THIS ISSUE

Production Editor: Zi-Hang Xu; Production Department Director: Xiang Li; Cover Editor: Jia-Ru Fan.

NAME OF JOURNAL	INSTRUCTIONS TO AUTHORS
World Journal of Gastrointestinal Surgery	https://www.wjgnet.com/bpg/gerinfo/204
ISSN	GUIDELINES FOR ETHICS DOCUMENTS
ISSN 1948-9366 (online)	https://www.wjgnet.com/bpg/GerInfo/287
LAUNCH DATE	GUIDELINES FOR NON-NATIVE SPEAKERS OF ENGLISH
November 30, 2009	https://www.wjgnet.com/bpg/gerinfo/240
FREQUENCY	PUBLICATION ETHICS
Monthly	https://www.wjgnet.com/bpg/GerInfo/288
EDITORS-IN-CHIEF Peter Schemmer	PUBLICATION MISCONDUCT https://www.wjgnet.com/bpg/gerinfo/208
EDITORIAL BOARD MEMBERS	ARTICLE PROCESSING CHARGE
https://www.wjgnet.com/1948-9366/editorialboard.htm	https://www.wjgnet.com/bpg/gerinfo/242
PUBLICATION DATE	STEPS FOR SUBMITTING MANUSCRIPTS
July 27, 2024	https://www.wjgnet.com/bpg/GerInfo/239
COPYRIGHT	ONLINE SUBMISSION
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World J Gastrointest Surg 2024 July 27; 16(7): 2119-2126

DOI: 10.4240/wjgs.v16.i7.2119

ISSN 1948-9366 (online)

ORIGINAL ARTICLE

Retrospective Study Effect of rapid rehabilitation nursing on improving clinical outcomes in postoperative patients with colorectal cancer

Jing-Yan Song, Jing Cao, Jian Mao, Jiang-Lian Wang

Specialty type: Gastroenterology and hepatology

Provenance and peer review: Unsolicited article; Externally peer reviewed.

Peer-review model: Single blind

Peer-review report's classification Scientific Quality: Grade C Novelty: Grade B Creativity or Innovation: Grade C Scientific Significance: Grade B

P-Reviewer: Cheong JH, South Korea

Received: March 25, 2024 Revised: May 7, 2024 Accepted: June 6, 2024 Published online: July 27, 2024 Processing time: 118 Days and 21.6 Hours



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Abstract

BACKGROUND

Surgical resection is the cornerstone treatment for colorectal cancer. Rapid rehabilitation care predicated on evidence-based medical theory aims to improve postoperative nursing care, subsequently reducing the physical and mental traumatic stress response and helping patients who undergo surgery recover rapidly.

AIM

To assess the effect of rapid rehabilitation care on clinical outcomes, including overall postoperative complications, anastomotic leaks, wound infections, and intestinal obstruction in patients with colorectal cancer.

METHODS

We searched the PubMed, Web of Science, Embase, Elsevier Science Direct, and Springer Link databases from January 1, 2010, to January 1, 2024, to screen eligible studies on rapid rehabilitation care among patients who underwent colorectal cancer surgery. Patients were screened based on the inclusion and exclusion criteria. RevMan 5.4 software was used for statistical analysis of the data.

RESULTS

Twelve studies were enrolled, which included 2420 patients. The results showed that rapid rehabilitation care decreased the incidence of overall postoperative



complications (OR: 0.44, 95%CI: 0.26–0.74, P = 0.002), anastomotic leaks (OR: 0.68, 95%CI: 0.41–1.12, P = 0.13), wound infections (OR: 0.45, 95% CI: 0.29–0.72, P = 0.0007), and intestinal obstruction (OR: 0.54, 95% CI: 0.34–0.86, P = 0.01) compared to conventional care. Further trials and studies are needed to confirm these results.

CONCLUSION

Rapid rehabilitation care decreased the occurrence of postoperative complications, anastomotic leaks, wound infections, and intestinal obstruction compared to conventional care in patients who underwent colorectal surgery. Therefore, promoting the application of rapid rehabilitation care in clinical practice cannot be overemphasized.

Key Words: Rapid rehabilitation care; Anastomotic leak; Wound infection; Intestinal obstruction; Colorectal cancer

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Core Tip: Rapid rehabilitation care has been applied to optimize postoperative management. This retrospective study focused on the effect of rapid rehabilitation care on clinical outcomes following colorectal cancer surgery. Twelve studies, including 2420 patients undergoing colorectal cancer surgery, were assessed in this study. The findings indicated that rapid rehabilitation care significantly decreased the occurrence of overall postoperative complications, anastomotic leaks, wound infections, and intestinal obstruction compared with conventional care in patients who underwent colorectal cancer surgery.

Citation: Song JY, Cao J, Mao J, Wang JL. Effect of rapid rehabilitation nursing on improving clinical outcomes in postoperative patients with colorectal cancer. World J Gastrointest Surg 2024; 16(7): 2119-2126 URL: https://www.wjgnet.com/1948-9366/full/v16/i7/2119.htm DOI: https://dx.doi.org/10.4240/wjgs.v16.i7.2119

INTRODUCTION

Colorectal cancer is one of the most common cancers globally [1]. More than half of new colorectal cancer cases and deaths worldwide occur in China, Europe, and northern America; however, although the morbidity and mortality of colorectal cancer have decreased in some European and northern American countries, they have been increasing in China[2]. Surgical resection is considered the cornerstone treatment for colorectal cancer; however, this type of surgery is complicated and leads to severe postoperative complications, which are common and challenging nursing concerns[3,4]. When postoperative complications are not resolved promptly, they may affect the healing of intestinal anastomosis and wounds or result in other complications, subsequently prolonging the postoperative recovery time and increasing postoperative pain[5,6]. Therefore, comprehensive postoperative care is critical in intestinal functional recovery and decreasing postoperative complications after colorectal surgery [7,8].

Rapid rehabilitation care has become an increasingly common strategy to improve the quality of life of patients by facilitating early intestinal functional recovery, decreasing postoperative complications, shortening hospital stays, and reducing health costs[9,10]. Although both conventional and rapid rehabilitation care focus on providing high-quality care to promote intestinal functional recovery, rapid rehabilitation care offers additional benefits. Conventional care includes patient education, incision nursing, and complications management, whereas rapid rehabilitation care takes a more comprehensive approach, and includes perioperative nursing, complications management, pain relief, functional exercise, and psychological support[11].

Previous research, including clinical trials or observational studies, has demonstrated the positive effect of rapid rehabilitation care. In addition to colorectal surgery care, this method has been widely applied to other surgical specia-Ities, including orthopedic, cardiac, and gastric management[11]. Studies that reported rapid rehabilitation care only in a small sample size at surgical institutions cannot provide strong evidence. Therefore, to improve the confidence level of the study, pooling independent and similar clinical trials and observational studies can increase precision. This study aimed to identify the impact of rapid rehabilitation care in improving postoperative results and compare intestinal functional outcomes between rapid rehabilitation and conventional care for patients who underwent colorectal cancer surgery.

MATERIALS AND METHODS

Search strategy and study selection

We searched PubMed, Web of Science, Embase, Elsevier Science Direct, and Springer Link databases from January 1, 2010, to January 1, 2024, to identify eligible studies. The search terms in the search strategy and study selection were "postoperative care", "postoperative complications", "anastomotic leaks", "wound infections", and "intestinal obstruction". The search strategy was adopted for all selected databases. Moreover, the references of the journals were



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Figure 1 Flowchart of literature search and study selection process.

screened to find eligible studies that were not captured from the databases.

Inclusion and exclusion criteria

The inclusion criteria were: (1) Patients who underwent colorectal cancer surgery; (2) comparative studies on rapid rehabilitation and conventional care; (3) studies reporting at least one of the following: postoperative complications, anastomotic leaks, wound infections, and intestinal obstruction; (4) clinical trials or prospective or retrospective studies; and (5) studies with sufficient data. The exclusion criteria were: (1) Articles that did not meet the inclusion criteria; (2) duplicate articles; (3) reviews, case reports, and conference abstracts; and (4) articles with incomplete data.

Data extraction

Relevant data were extracted from eligible studies according to the inclusion and exclusion criteria: (1) Study characteristics, including first author, year of publication, and comparator group details; (2) patient characteristics, including sample size, age, and sex; and (3) endpoints: postoperative complications, anastomotic leaks, wound infections, and intestinal obstruction.

Statistical analysis

The l^2 statistic was used to test for heterogeneity. When $l^2 < 50\%$ and P > 0.1, a fixed-effects model was used, indicating that the included studies were homogeneous. When $l^2 > 50\%$ or P < 0.1, a random-effects model was adopted. Odds ratios (ORs) and 95% confidence intervals (CIs) were considered as the indicators for dichotomous variables. Publication bias was evaluated by funnel plots. RevMan 5.4 software was used for this meta-analysis.

RESULTS

Characteristics of the studies and patients

Figure 1 shows the flowchart of the literature search process. Twelve studies [12-23], including 2420 patients, were finally enrolled after removing duplicate and ineligible studies based on the inclusion and exclusion criteria. According to the two interventions, patients were divided into rapid rehabilitation and conventional care groups, with 1336 and 1084 patients in each group, respectively. The clinical characteristics of selected studies and patients are presented in Table 1.

Postoperative complications

Six studies with 1431 patients reported the occurrence of overall postoperative complications (Figure 2A). The rapid rehabilitation care group was defined as the experimental group with 718 patients, while the conventional group was defined as the control group with 713 patients. The random-effect model was adopted for this analysis due to moderate statistical heterogeneity (l^2 =55%, P = 0.05). Compared with the conventional care group, the occurrence of overall postoperative complications in the rapid rehabilitation care group was significantly lower postoperatively (OR: 0.44, 95% CI: 0.26–0.74, *P* = 0.002). These results suggest that rapid rehabilitation care decreases the occurrence of overall postoperative complications among patients who underwent colorectal cancer surgery.



Table 1 Characteristics of the included studies and patients											
	•	Cases of patients		Median age (years)		Gender ratio (male/female)					
Ref.	Sample size	Rapid rehabilitation care	Conventional care	Rapid rehabilitation care	Conventional care	Rapid rehabilitation care	Conventional care				
Sato <i>et al</i> [12], 2023	388	289	99	74 (32-94)	74 (30-92)	131/158	44/55				
Bellato <i>et al</i> [13], 2021	82	49	33	69.02 ± 12.8	66.51 ± 10.12	28/21	18/15				
Xu <i>et al</i> [<mark>14</mark>], 2019	154	96	58	55.38 ± 15.11	56.17 ± 15.81	36/60	24/34				
Li <i>et al</i> [<mark>15</mark>], 2019	200	100	100	56.2 ± 5.5	55.3 ± 5.3	65/35	68/32				
Shetiwy <i>et al</i> [<mark>16</mark>], 2017	70	35	35	53.63 ± 11.5	48.54 ± 12.29	24/11	21/14				
Feng <i>et al</i> [17], 2016	230	116	114	58.12 ± 11.04	58.31 ± 10.89	66/50	63/51				
Jia <i>et al</i> [<mark>18</mark>], 2014	233	117	116	75.66 ± 4.18	74.78 ± 4.01	76/41	70/46				
Feng <i>et al</i> [19], 2014	116	57	59	53.95 ± 11.95	56.31 ± 11.52	36/21	40/19				
Yang <i>et al</i> [<mark>20</mark>], 2012	62	32	30	57.2 ± 11.70	59.5 ± 12.10	12/20	8/22				
Ren <i>et al</i> [<mark>23</mark>], 2012	597	299	298	59 (24-78)	61 (21-80)	178/121	190/108				
Wang <i>et al</i> [21], 2012	78	40	38	71 (65-81)	72 (65-82)	22/18	20/18				
Wang <i>et al</i> [22], 2011	210	106	104	57 (38-69)	55 (40-67)	65/41	60/44				

Anastomotic leaks

The meta-analysis for anastomotic leaks enrolled 12 studies (Figure 2B), including 2,420 participants, with 1336 in the rapid rehabilitation care group and 1084 in the conventional care group. A fixed-effect model was used for this analysis as no statistical heterogeneity was observed in the included studies ($I^2 = 2\%$, P = 0.42). The occurrence of anastomotic leaks was significantly lower in the rapid rehabilitation care group than in the conventional care group (OR: 0.68, 95% CI: 0.41–1.12, P = 0.13). These results suggest that rapid rehabilitation care produces a significantly lower incidence of anastomotic leakage than routine nursing care.

Wound infections

According to the 11 studies (Figure 2C) that presented data on wound infections following colorectal cancer surgery, there were 1047 patients in the rapid rehabilitation care group and 985 patients in the conventional care group. A fixed-effect model was adopted as no statistical heterogeneity was observed in the studies ($I^2 = 0\%$, P = 0.88). Compared with the conventional group, the occurrence of wound infection was significantly lower in the rapid rehabilitation care group (OR: 0.45, 95%CI: 0.29–0.72, P = 0.0007), indicating that rapid rehabilitation care decreases the occurrence of wound infections in patients who underwent colorectal cancer surgery.

Intestinal obstruction

Nine of the included studies (Figure 2D) reported on intestinal obstruction, with 1159 patients in the rapid rehabilitation care group and 963 patients in the control group. A fixed-effects model was used for this analysis as no statistical heterogeneity was observed in the selected studies ($I^2 = 0\%$, P = 0.99). The rapid rehabilitation care group had a lower incidence of intestinal obstruction than the conventional group (OR: 0.54, 95%CI: 0.34–0.86, P = 0.01), suggesting that rapid rehabilitation care reduces the occurrence of intestinal obstruction in patients who underwent colorectal cancer surgery.

Publication bias

In this meta-analysis, funnel plots were performed to assess publication bias (Figure 3). The results showed no significant publication bias as the studies were symmetrically distributed.

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A Experimen		(perimental Con		Control Odds ratio			Odds ratio
Study or subgroup	Events	Total	Events	Total	Weight	M-H, random, 95%C	I M-H, random, 95%CI
Feng F 2014	2	57	10	59	8.5%	0.18 [0.04, 0.85]	
Feng J 2016	7	116	17	114	16.5%	0.37 [0.15, 0.92]	
Li Q 2019	12	100	25	100	19.8%	0.41 [0.19, 0.87]	
Ren L 2012	29	299	28	298	24.5%	1.04 [0.60, 1.79]	
Wang G 2011	20	106	39	104	22.6%	0.39 [0.21, 0.73]	
Wang Q 2012	2	40	8	38	8.0%	0.20 [0.04, 1.00]	
Total (95%CI)		718		713	100.0%	0.44 [0.26, 0.74]	•
Total events	72		127				
Heterogeneity: Tau ² =	0.22; Chi ²	= 11.09,	df = 5 (P	e = 0.05); l ² = 55%	b	
Test for overall effect:	Z = 3.06 (A	P = 0.002	2)				Favours [experimental] Favours [control]

B Experimental Control Odds rat		Odds ratio	Odds ratio				
Study or subgroup	Events	Total	Events	Total	Weight	M-H, fixed, 95%C	M-H, fixed, 95%CI
Bellato V 2021	3	49	2	33	6.0%	1.01 [0.16, 6.40]	
Feng F 2014	0	57	4	59	11.8%	0.11 [0.01, 2.04]	
Feng J 2016	1	116	3	114	8.1%	0.32 [0.03, 3.14]	
Jia Y 2014	3	117	2	116	5.3%	1.50 [0.25, 9.15]	
Li Q 2019	3	100	6	100	15.6%	0.48 [0.12, 1.99]	
Ren L 2012	5	299	5	298	13.2%	1.00 [0.29, 3.48]	_
Sato H 2023	12	289	3	99	11.5%	1.39 [0.38, 5.02]	
Shetiwy M 2017	1	35	7	35	18.3%	0.12 [0.01, 1.01]	
Wang G 2011	4	106	2	104	5.2%	2.00 [0.36, 11.16]	
Wang Q 2012	0	40	0	38		Not estimable	
Xu F 2019	0	96	1	58	5.0%	0.20 [0.01, 4.96]	· · · · · · · · · · · · · · · · · · ·
Yang D 2012	0	32	0	30		Not estimable	
Total (95%CI)		1336		1084	100.0%	0.68 [0.41, 1.12]	•
Total events	32		35				
Heterogeneity: Chi ² = 9	.21, df = 9	P = 0.4	42); l ² = 2	%			
Test for overall effect: 2	Z = 1.51 (<i>P</i>	2 = 0.13)	,,				0.001 0.1 1 10 1000 Favours [experimental] Favours [control]

C	Experir	nental	Cor	itrol		Odds ratio		(Odds ratio		
Study or subgroup	Events	Total	Events	Total	Weight	M-H, fixed, 95%CI		M-H	, fixed, 95%	∕₀CI	
Bellato V 2021	2	49	4	33	8.1%	0.31 [0.05, 1.79]					
Feng F 2014	0	57	1	59	2.6%	0.34 [0.01, 8.50]					
Feng J 2016	1	116	3	114	5.3%	0.32 [0.03, 3.14]	-				
Jia Y 2014	6	117	8	116	13.4%	0.73 [0.25, 2.17]			-		
Li Q 2019	3	100	6	100	10.3%	0.48 [0.12, 1.99]					
Ren L 2012	5	299	5	298	8.7%	1.00 [0.29, 3.48]			-	-	
Shetiwy M 2017	2	35	11	35	18.3%	0.13 [0.03, 0.65]		•	-		
Wang G 2011	4	106	7	104	12.0%	0.54 [0.15, 1.91]			•		
Wang Q 2012	1	40	3	38	5.3%	0.30 [0.03, 3.01]	_				
Xu F 2019	4	96	6	58	12.6%	0.38 [0.10, 1.40]		-			
Yang D 2012	1	32	2	30	3.5%	0.45 [0.04, 5.26]		්	•		
Total (95%CI)		1047		985	100.0%	0.45 [0.29, 0.72]		-			
Total events	29		56								
Heterogeneity: Chi ² =	5.14, df = 1	10(P = 0)	.88); l ² =	0%			L 0.01			10	100
Test for overall effect:	Z = 3.39 (A	P = 0.000	07)				0.01 Eavor	U.I	I Fall Favou	10 [control]	100
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Figure 2 Forest plot. A: Overall postoperative complications; B: Anastomotic leaks; C: Wound infections; D: Intestinal obstruction.

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Figure 3 Funnel plot for publication bias. A: Overall postoperative complications; B: Anastomotic leaks; C: Wound infections; D: Intestinal obstruction.

DISCUSSION

Colorectal cancer is the third most common malignant tumor in men and the second most common in women[24]. Surgery is the first-line treatment for colorectal cancer^[25]. Supportive care is important for helping patients to manage symptoms after colorectal cancer surgery [26]. In the absence of prompt, effective nursing strategies after surgical resection, postoperative complications can cause physical and mental harm to patients[6,27]. Many studies have demonstrated that the implementation of rapid rehabilitation care has reached satisfactory levels in clinical outcomes among patients with colorectal cancer. Wang et al[21] conducted a randomized trial and found that rapid rehabilitation care resulted in faster postoperative functional recovery, fewer complications, and earlier discharge from the hospital compared with conventional postoperative care. Similarly, a prospective study demonstrated that rapid rehabilitation nursing effectively promotes postoperative rehabilitation, reduces complications, and improves patients' quality of life [14]. Moreover, Ripollés-Melchor et al [28] initiated a prospective study and found that implementing enhanced recovery after surgery decreased the occurrence of postoperative complications, and shortened the length of hospital stay. These findings are consistent with the results of this study in terms of postoperative complications. However, a single-center retrospective study found that enhanced recovery after surgery significantly shortened the length of hospital stay without decreasing the incidence of postoperative complications among patients with T4 colorectal cancer[13]. This might be explained by the fact that this study specifically included patients with T4 colorectal cancer, often consisting of fragile patients who may require multi-organ resection and open surgery, that are historically less suitable for enhanced recovery after surgery. Additionally, a multi-center prospective study suggested that enhanced recovery after surgery led to a shorter length of hospital stay and a lower number of patients with moderate to severe complications compared with traditional care; however, the overall number of postoperative complications was comparable between the two types of care, which may have resulted from non-randomized care, leading residual confounding from either measured or unmeasured variables^[29]. Therefore, controversy regarding rapid rehabilitation care application remains among researchers.

Here, we assessed the impact of rapid rehabilitation and conventional care on clinical outcomes among patients who underwent colorectal cancer surgery. A total of 12 studies, including 2420 patients who received colorectal cancer surgery, were assessed: 1340 received rapid rehabilitation care, and 1084 received conventional care. Compared with conventional care, rapid rehabilitation care significantly decreased the occurrence of postoperative complications (OR: 0.44, 95% CI: 0.26–0.74, P = 0.002), anastomotic leakage (OR: 0.68, 95% CI: 0.41–1.12, P = 0.13), wound infections (OR: 0.45, 95% CI: 0.29–0.72, P = 0.0007), and intestinal obstruction (OR: 0.54, 95% CI: 0.34–0.86, P = 0.01). These results suggest that rapid rehabilitation care can significantly decrease the occurrence of overall postoperative complications, anastomotic leaks, wound infections, and intestinal obstruction in patients undergoing colorectal cancer surgery.

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Despite these promising results, this study has some limitations. First, the relatively small number of included studies might influence the generalizability of the results. Second, regarding the participants, interventions, and outcomes, the included studies presented some heterogeneity that might have affected the results. More precise and larger studies are required to confirm these advantages of rapid rehabilitation care in the future.

CONCLUSION

This study provides evidence that rapid rehabilitation care produced better outcomes regarding overall postoperative complications, anastomotic leaks, wound infections, and intestinal obstruction than conventional care. Therefore, implementing rapid rehabilitation care is preferred to facilitate a more rapid functional recovery, decrease the incidence of surgical complications, and enhance the quality of life of patients who undergo colorectal cancer surgery in clinical practice.

FOOTNOTES

Author contributions: Song JY, Cao J, Mao J, Wang JL designed the research; Cao J, Mao J performed the research; Wang JL contributed new reagents/analytic tools; Cao J, Mao J, Wang JL analyzed data; Song JY wrote the paper.

Institutional review board statement: The study was reviewed and approved by The First Affiliated Hospital of Chongqing Medical University.

Informed consent statement: All study participants or their legal guardian provided informed written consent regarding personal and medical data collection prior to study enrolment.

Conflict-of-interest statement: The authors declare no conflicts of interest for this article.

Data sharing statement: Technical appendix, statistical code, and dataset available from the corresponding author at songjy888@126.com. Participants gave informed consent for data sharing.

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Country of origin: China

ORCID number: Jing-Yan Song 0009-0001-9369-1546.

S-Editor: Lin C L-Editor: Webster IR P-Editor: Wang WB

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