

Risk Factors for Severe 30-d Complications After Minimally Invasive Radical Cystectomy With Ileal Conduit

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Research

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Abstract

Background: To investigate the risk factors for severe complications within 30 days in patients receiving minimally invasive radical cystectomy with ileal conduit(MIRCIC).

Methods: 270 consecutive patients who underwent MIRCIC between January 1, 2013 and August 1, 2020 were included. All complications were graded according to the Clavien-Dindo classification(CDC). The comprehensive complication index(CCI) for all complications in each patient was calculated. $CDC \geq \text{III}$ or $CCI > 33.7$ were considered to be severe complications. Univariate and multivariate analysis were conducted by SPSS26.

Results: A total of 691 complications were collected from 236 patients and the corresponding overall complications rate was 87.41% (236/270). Patients with $CDC \geq \text{III}$ accounted for 23.70% and the incidence of $CCI > 33.7$ was 22.96%. For the highest CDC grade $\geq \text{III}$, in univariate analysis, the following seven variants were enrolled in a multivariate analysis: BMI ($P=0.010$), baseline albumin($P=0.065$), pT ($P=0.082$), pN ($P=0.026$), pTNM ($P=0.016$), intraoperative blood transfusion ($P=0.031$), estimated blood loss ($P=0.001$). In multivariate analysis, $BMI \geq 30\text{kg/m}^2$ ($P=0.012$) and estimated blood loss $\geq 400\text{ml}$ ($P=0.005$) were the independent risk factors of $CDC \geq \text{III}$. Hydronephrosis ($P=0.050$), BMI ($P=0.006$), pT ($P=0.004$), pN ($P=0.019$), pTNM ($P=0.000$), operative time ($P=0.030$), estimated blood loss ($P=0.001$) were the relevant factors in $CCI > 33.7$. However, $BMI \geq 30\text{kg/m}^2$ ($P=0.004$) and estimated blood loss ($P=0.002$) were the independent risk factors of $CCI > 33.7$.

Conclusion: $BMI \geq 30\text{kg/m}^2$ and estimated blood loss $\geq 400\text{ml}$ were found to be independent predictors of 30-d severe complications ($CDC \geq \text{III}$ or $CCI > 33.7$) in patients who underwent MIRCIC.

Background

Bladder cancer is the 10th most common malignant tumor in the world, ranking the 9th among the cause of cancer death in men^[1]. Nowadays, minimally invasive radical cystectomy(MIRC), including laparoscopic and robot-assisted radical cystectomy(LRC and RARC), has been an important therapeutic strategy for patients with bladder cancer^[2-9]. The choice of urinary diversion following radical cystectomy is closely related to postoperative complications and life quality of patients. Ureterocutaneostomy is the simplest and safest option of incontinent diversion for selected patients, such as single kidney or limited life expectancy^[10,11]. Ileal conduit and orthotopic neobladder are the two most commonly used methods^[10], while the trend of the latter is gradually decreasing as it is more suitable for young and healthy male patients^[12]. By using a strictly defined complication catalog, Vetterlein et al. reported a 99.4% complication rate within 30 days after radical cystectomy, containing 84% of grade III/IV complications that may not impair the rehabilitation process^[13]. Therefore, it is of more clinical value to analyze the occurrence of severe complications. The Clavien-Dindo classification(CDC)^[14] and comprehensive complication index(CCI)^[15] are two of the most commonly used measures of postoperative morbidity. The main objective of our research is to investigate the risk factors for severe complications within 30 days in patients receiving minimally invasive radical cystectomy with ileal conduit(MIRCIC).

Methods

Patients, Data and Definitions

This was an observational study approved by the institutional review board. 270 records of MIRCIC between January 1, 2013 and August 1, 2020 were retrieved from the electronic medical database of the Second Xiangya Hospital of Central South University. The indications for MIRCIC include muscle-invasive(T2-T4a,N0-x,M0) and high-risk non-muscle-invasive bladder cancer. The operations were performed by three surgeons proficient in both LRC and RARC. Data were reviewed in terms of clinical, surgical and pathological variables, including gender, age, coronary heart disease, diabetes, hypertension, hydronephrosis, previous abdominal surgery, age-adjusted Charlson comorbidity index(ACCI)^[16], American Society of Anesthesiologists (ASA) score, body mass index(BMI), preoperative anemia, baseline albumin, pathological TNM stage (PTNM), positive surgical margin, histological type, lymphatic vascular infiltration, minimally invasive tool, operative time, intraoperative blood transfusion, estimated blood loss and 30-d complications. Postoperative pathological results were staged according to the 8th AJCC Cancer Manual^[17]. All complications were graded according to the CDC^[14] and the patient's CDC rating depended on the highest grade of his/her complications. $CDC \geq \text{III}$

was considered to be severe complications. The CCI values of all complications for each patient were integrated. The calculation formula is: $CCI = \sqrt{([1]MRVphys \times MRVpat)/2}$ ^[15]. $CCI > 33.7$ was also defined as severe complications^[13].

Surgery

We performed a five-port technique for both LRC and RARC(one port for the assistant): a 12-mm trocar was placed at 2cm above the navel edge for the camera, the two operating trocar were placed at the navel level with four transverse finger away from the camera port. The forth trocar was placed above the left iliac crest. The last trocar was located on the inner side of the right iliac crest to facilitate the sticking of the ostomy bag. Patient was placed in a steep Trendelenburg (30°) position after establishing the pneumoperitoneum. Severed the ureters close to the bladder; transected seminal vesicles and vasdeferens; detached the dorsal side of the bladder and prostate under the Denonvilliers fascia; clipped the superior vesical arteries; separated and severed lateral ligament of bladder; transected and severed the dorsal venous complex; divided prostatic apex and urethra. The excision for women covers the uterus, fallopian tubes, ovaries, bladder, front vaginal wall and urethra. All patients underwent extracorporeal ileal conduit and standard pelvic lymph node dissection^[10].

Statistical analysis

Categorical variables were presented as the frequency (ratio). Univariate analysis was performed by using chi-square test or fisher exact method, and factors with $p < 0.1$ were admitted into multivariate analysis, which was performed by binary logistic regression model. IBM SPSS26 statistics software was used for statistical analysis and $p < 0.05$ suggested a statistical difference in the study.

Results

Table 1 describes all 30-d complications, therapeutic managements and CDC grades in 270 patients with MIRCIC. None of patients received neoadjuvant chemoradiotherapy and open conversion. A total of 691 complications were collected from 236 patients: 366 cases of CDC I, 240 cases of CDC II, 53 cases of CDC IIIa, 19 cases of CDC IIIb, 9 cases of CDC IIIa and 4 cases of CDC IIIb(Fig1-A). So the corresponding overall complications rate was 87.41% (236/270). Urinary tract infection was the most common postoperative complication (34.44%, 93/270), followed by intestinal obstruction (21.48%, 58/270). There were 85 complications of $CDC \geq III$ in 64 patients and the severe complications rate was a 23.70% (64/270), including 40 cases of intestinal obstruction, 3 cases of gastrointestinal bleeding, 6 cases of small bowel leakage, 1 case of rectal rupture, 10 cases of wound dehiscence, 2 cases of intraperitoneal infection, 1 case of scrotal abscess, 1 case of congestive heart failure, 1 case of shock, 4 cases of death, 3 cases of lymphatic leakage, 3 cases of urine leakage, 6 cases of acute kidney failure, 3 cases of respiratory failure and 1 case of foreign body in the urethra. Figures 1-B exhibits the association between the highest CDC grade of 30-d complications and CCI. Figures 1-C presents the connection between numbers of complications and CCI. The proportion of $CCI > 33.7$ was 22.96% (62/270).

For the highest CDC grade $\geq III$, in univariate analysis, the following seven variants were enrolled in the multivariate analysis: BMI ($P=0.010$), baseline albumin($P=0.065$), pT ($P=0.082$), pN ($P=0.026$), pTNM ($P=0.016$), intraoperative blood transfusion ($P=0.031$), estimated blood loss ($P=0.001$). Hydronephrosis ($P=0.050$), BMI ($P=0.006$), pT ($P=0.004$), pN ($P=0.019$), pTNM ($P=0.000$), operative time ($P=0.030$), estimated blood loss ($P=0.001$) were the relevant factors in $CCI > 33.7$ (Table 2).

In multivariate analysis, $BMI \geq 30\text{kg/m}^2$ ($P=0.012$) and estimated blood loss $\geq 400\text{ml}$ ($P=0.005$) were the independent risk factors of $CDC \geq III$ (Table 3). Likewise, $BMI > 30\text{kg/m}^2$ ($P=0.004$) and estimated blood loss ($P=0.002$) were the independent risk factors of $CCI > 33.7$ (Table 4).

Discussion

MIRC has become a mainstream surgical option for bladder cancer patients with curative intent in most medical centers, because its effectiveness and safeness have been well demonstrated, namely less pain, smaller trauma and quicker recovery^[2-9]. The history of LRC can be traced back to 1992^[18], despite the advantages mentioned above, it has a higher demand on surgeons both in anatomical knowledge and endoscopic skills. The first robotic surgery system was approved into clinical use in 1994^[19], and surgical robot provides us with flexible mechanical arms and 3-Demesion vision. There was no significant difference in effectiveness and safety between RARC and LRC based on the current pooled evidence: the surgery duration, positive surgical

margin rate, postoperative recovery and complications were comparable for both approaches^[20]. Urinary diversion is a critical step after bladder removal and the choice should take into account the patient's wishes, age, underlying diseases, tumor stage and life expectancy. Ileal conduit is one of the most classic and widely used urinary diversion procedures following bladder resection^[10,12]. The incidence of overall 30-d complications was 87.41% (236/270) in our center, but CDC grade I and II complications accounted for 87% (606/691). Similarly, a single-center retrospective study captured 2485 complications in 506 patients with a 99.4% (503/506) 30-d complications rate, whereas 84% of them were CDC grade I or II^[13]. However, the 30-d complications rates of MIRC in five articles included in a meta-analysis were 41.2% (14/34), 66.7% (26/39), 15% (3/20), 43% (52/121) and 45.5% (5/11), respectively^[20]. There was still a distinct discrepancy in reporting of complications after radical cystectomy^[21], because those minor complications were neglected by researchers who held such views that single low-level complication doesn't necessarily impair the postoperative course of patients. Vetterlein et al pointed out that the occurrence of massive minor complications doesn't mean treatment failure, and detailed documentation of postoperative adverse events that potentially damage recovery and quality of life of patients is essential for patient consultation, clinical trial design and treatment efficiency assessment^[13]. Besides, severe complication, which can cause serious physical, psychological and financial harm to patients, is surgeons' greatest concern and patients' least desire. The primary purpose of this study was to investigate risk factors for severe complications within 30 days after MIRCIC.

CDC is currently the most commonly used complication assessment method, and numerous studies incorporate CDC \geq I into "major complication". A retrospective research of Zhang et al. included 298 cases of MIRC and revealed that the proportion of patients with major complication was 15.1% (45/298)^[22]. Su et al. reviewed the clinical data of 126 patients with LRC and 189 patients with RACRC, and found an rate of 7.62% (24/315) about postoperative overall major complications^[23]. In contrast, the ratio of patients with CDC \geq III was higher in our study(23.70% ,64/270). The reason may be that we had an rigorous inclusion criteria for the method of urinary diversion, while 55.7% and 25.7% of other types of diversion were involved in the above two studies, respectively. The occurrence rate of gastrointestinal complications after radical cystectomy was about 29%^[24]. Svatek et al. performed a study involving 283 patients undergoing open radical cystectomy and indicated that the incidence of postoperative paralytic ileus was 15.2%^[25].Furthermore, BMI (95%CI: 1.03-1.17, P =.007) and age (95%CI: 1.02-1.16, P =.008) were independent risk factors of paralytic ileus^[25]. In this paper, our results confirmed that the most common major complication was ileus with an rate of 23.70% (64/270), and BMI \geq 30 kg/m² (95% CI: 1.216-5.032, P = 0.012) and estimated blood loss \geq 400ml (95% CI: 1.367-5.992, P = 0.005) were the independent predictors of CDC \geq II. Increased BMI was associated with higher postoperative complication rates, comprising infection-related diseases, wound-related diseases, acute kidney injury and paralytic ileus^[26]. In the article of Lenardis et al., the major complication was defined as one of the following postoperative events: cardiac or neurological complications, reoperation and death^[27]. Patients with BMI \geq 30kg/m² were significantly more likely to undergo major complications within 30 days after radical cystectomy than those with normal BMI(OR 1.59, 95% CI 1.17-2.16)^[27]. Likewise, Arora and colleagues published their study with 2055 patients receiving radical cystectomy, and they suggested that a high BMI was highly correlated with 30-d mortality and morbidity^[28]. In minimally invasive surgery, even a small amount of bleeding can seriously impair the clarity of operative visual field due to the magnification of camera lens. Lin et al. conducted a prospective randomized controlled trial and asserted that the application of minimally invasive tool significantly reduced intraoperative blood loss compared to conventional open surgery(215ml vs 510ml,P<0.001)^[2]. A latest meta-analysis verified that there was no significant difference in intraoperative blood loss between LRC and RARC (95%CI: -37.81-258.62, P=0.14)^[20]. Wilson and workmates retrospectively analyzed the data of 2934 cases and deemed that perioperative blood transfusion was associated with increased morbidity(OR 1.361, 95% CI 1.131-1.638)^[29]. Shen et al. concluded that the need for postoperative blood transfusion, rather than intraoperative blood transfusion, was independently associated with perioperative morbidity^[30]. Intraoperative blood transfusion was not associated with the rate of 30-d severe complications but estimated blood loss was an independent predictor of 30-d severe complications(CDC \geq I or CCI > 33.7) in our study(OR 2.862, 95% CI 1.367-5.992; OR 2.904 95% CI 1.497-5.634). Reason may be that intraoperative blood product requirements were closely related to preoperative anaemia^[30], while the degree of anemia was relatively mild before surgery in our research, in which the median HB value was 129g/L(interquartile range: 116-140g/L). Secondly, postoperative blood transfusion may be due to massive intraoperative bleeding or other serious complications such as gastrointestinal bleeding, so, the inclusion of it in multiple logistic regression analysis may lead to greater bias.

CCI is a new complication evaluation method developed on the basis of CDC, and it integrates all postoperative complications to obtain the cumulative morbidity, which is conducive to the comprehensive evaluation of patient recovery^[15]. CCI values was positively associated with the number and grade of complications, and patients with CCI value exceeding 33.7 accounted for 20%^[13], which was also verified in this study. In addition, we further confirmed the feasibility of CCI in evaluating severe complications after radical surgery. BMI $\geq 30\text{kg/m}^2$ (95%CI: 1.411-6.510, P=0.004) and estimated blood loss $\geq 400\text{ml}$ (95%CI: 1.497-5.634, P=0.002) were also independent risk factors for patients with CCI >33.7. Therefore, it is necessary to evaluate and control BMI before MIRCIC, and to minimize the amount of blood loss during the operation.

Admittedly, there were several limitations to this study. Firstly, Our study was a single-center retrospective study with its inherent drawbacks. Secondly, different surgical habits and treatment ideas among the three surgeons may lead to some bias. Thirdly, the present study only included complications occurring within 30 days after MIRCIC. However, it is indubitably crucial to predict long-term procedure-specific severe complications and survival outcomes. To address these limitations, a multicenter prospective study is necessary. Nevertheless, this study enriches the perioperative data of MIRCIC and provides valuable clinical information for bladder cancer patients and urologists.

Conclusion

BMI $\geq 30\text{kg/m}^2$ and estimated blood loss $\geq 400\text{ml}$ were found to be independent predictors of 30-d severe complications (CDC $\geq \text{II}$ or CCI > 33.7) in patients who underwent MIRCIC.

Abbreviations

MIRC= minimally invasive radical cystectomy

LRC= laparoscopic radical cystectomy

RARC= robot-assisted radical cystectomy

CDC= Clavien-Dindo classification

CCI= comprehensive complication index

MIRCIC= minimally invasive radical cystectomy with ileal conduit

ACCI= age-adjusted Charlson comorbidity index

ASA= American Society of Anesthesiologists

BMI= body mass index

Declarations

Ethical approval and consent to participate

This study was approved by the Ethics Review Committee of the Second Xiangya Hospital of Central South University.

Consent fore publication

A complete informed consent was obtained from the patient and their families before the surgery. Informed consent was signed for all patients.

Availability of date and materials

The datasets used and analysed during the current study are available from the corresponding author on reasonable request

Competing interests

Xiao Ming, Zhong Zhaohui, Ren Jiannan, Xiong Wei have no conflict of interest to declare.

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Authors' contribution

Xiao Ming was responsible for study concepts, study design and the writing of the manuscript. Zhong Zhaohui was responsible for reviewing the article and proposing changes. Ren Jiannan collected and analyzed data. Xiong Wei was responsible for the starring revision of the article and study design. All authors read and approved the final manuscript.

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Tables

Table 1. Frequencies, proportions, therapeutic managements and grades of postoperative 30-d complications in 270 patients undergoing minimally invasive radical cystectomy with ileal conduit

	Management	CDC grade	Number	Proportion(%)	CDC ≥II	
					Number	Proportion(%)
Gastrointestinal						
Intestinal obstruction	total parenteral nutrition/insertion of gastric tube/laparotomy	IIIa IIIb	58	21.48	40	14.81
Gastrointestinal bleeding	conservative/blood transfusions/laparotomy	IIIa IIIb	18	6.67	3	1.11
Emesis/nausea(without ileus)	antiemetics	I	13	4.81	0	0
Intestinal leakage/enterobrosis	conservative/cathetering /laparotomy	IIIa IIIb	7	2.59	6	2.22
Rectal rupture	laparotomy	IIIb	1	0.37	1	0.37
Diarrhea/constipation	antidiarrheals/cathartic	I	21	7.78	0	0
Stress ulcer	conservative	I	3	1.11	0	0
Infectious						
Urinary tract infection	antibiotics	I	93	34.44	0	0
Wound infection/poor healing	conservative/antibiotics/second surgical closure	IIIa IIIb	26	9.63	10	3.70
Pneumonia	antibiotics	I	27	10.00	0	0
Intraperitoneal infection	antibiotics/abdominocentesis	IIIa	23	8.52	2	0.74
Scrotitis/scrotal abscess	antibiotics/puncture and drainage	IIIa	2	0.74	1	0.37
Fistula infection	antibiotics	I	1	0.37	0	0
Catheter-related infection	antibiotics	I	3	1.11	0	0
Intestinal infection	antibiotics	I	3	1.11	0	0
Cardiac						
Arrhythmia	conservative/medical cardioversion	II	9	3.33	0	0
Hypertension	antihypertensives	I	15	5.56	0	0
Congestive heart failure	ICU	IIIa	1	0.37	1	0.37
Angina	conservative	I	4	1.48	0	0
Hypotension/shock	Conservative/cardioactive drugs/ICU	IIIa	13	4.81	1	0.37
Neurological						
Vertigo	conservative	I	5	1.85	0	0
Delirium	antipsychotics	I	5	1.85	0	0
Transient Ischemic Attacks	conservative	I	2	0.74	0	0
Dermatologic						

Dermatitis	ointment	□	11	4.07	0	0
Allergy	conservative	□	2	0.74	0	0
Pneumoderm	conservative	□	2	0.74	0	0
Electrolyte disturbance						
Hyponatremia	electrolytes	□	35	12.96	0	0
Hypokalemia	electrolytes	□	35	12.96	0	0
Hyperkalemia	conservative	□	7	2.59	0	0
Death		□	4	1.48	4	1.48
Miscellaneous						
Urinary leak	delayed catheter extraction/drainage	☒☒a	30	11.11	3	1.11
Lymphorrhagia	delayed catheter extraction/drainage	☒☒a	54	20.00	3	1.11
Baryodynia	analgetics	□	34	12.59	0	0
Hypoglycemia	sugar	□	6	2.22	0	0
Hyperglycemia	insulin	□	13	4.81	0	0
Fever of unknown origin	antipyretics	□	17	6.30	0	0
Liver function damage	conservative	□	10	3.70	0	0
Gout flare	medical therapy	□	3	1.11	0	0
Kidney injury	conservative/drugs/nephrostomy/dialysis	☒☒ ☒a ☒a	45	16.67	6	2.22
Respiratory distress	conservative/ICU	☒ ☒a	6	2.22	3	1.11
Deep vein thrombosis	anticoagulation	□	11	4.07	0	0
Dental ulcer	conservative	□	3	1.11	0	0
Hydrocele	conservative	□	3	1.11	0	0
Foreign body in urethra	removal of foreign body	☒b	1	0.37	1	0.37
Ostomy related diseases	conservative/antibiotics	☐☐	6	2.22	0	0

Table 2. Univariate analysis for CDC \geq and CCI>33.7							
Variables	Patients	CDC \geq	χ^2	P	CCI>33.7	χ^2	P
Gender			0.493	0.483		0.024	0.876
man	238	58			55		
woman	32	6			7		
Age			0.040	0.841		0.023	0.881
<65	159	37			36		
\geq 65	111	27			26		
Coronary heart disease			0.528	0.577 ¹		0.432	0.772 ¹
no	252	61			59		
yes	18	3			3		
Diabetes			0.029	0.865		0.042	0.838
no	242	57			56		
yes	28	7			6		
Hypertension			0.053	0.819		0.203	0.653
no	172	40			38		
yes	98	24			24		
Hydronephrosis			0.618	0.432		3.828	0.050
no	201	45			40		
yes	69	19			22		
Previous abdominal surgery			0.417	0.519		0.097	0.755
no	234	57			53		
yes	36	7			9		
ACCI			0.073	0.787		0.052	0.819
\leq 3	199	48			45		
>3	71	16			17		
ASA score			1.518	0.218		0.064	0.800
\leq 2	117	32			26		
>2	153	32			36		
BMI			6.702	0.010		7.565	0.006
<30 kg/m ²	223	46			44		
\geq 30 kg/m ²	47	18			18		
Preoperative anemia			1.061	0.303		0.075	0.785
no	191	42			43		
yes	79	22			19		
Baseline albumin			3.408	0.065		1.860	0.173

<40 g/L	195	52			49	
≥40 g/L	75	12			13	
pT			3.028	0.082		8.419 0.004
≤T2	192	40			35	
>T2	78	24			27	
pN			4.956	0.026		5.538 0.019
negative	240	52			50	
positive	30	12			12	
pTNM			5.789	0.016		12.668 0.000
≤I	181	35			30	
≥I	89	29			32	
Positive surgical margin			2.241	0.163 ¹		2.483 0.154 ¹
no	258	59			57	
yes	12	5			5	
Histological type			0.077	0.782 ¹		2.226 0.157 ¹
urothelium	251	59			55	
non-urothelium	19	5			7	
Lymphatic vascular infiltration			0.409	0.522		1.488 0.222
no	242	56			53	
yes	28	8			9	
Minimally invasive tool			1.106	0.293		0.003 0.953
laparoscope	162	42			37	
robot	108	22			25	
Operative time			1.070	0.301		4.727 0.030
<420min	183	40			35	
≥420min	87	24			27	
Intraoperative blood transfusion			4.671	0.031		2.514 0.113
no	219	46			46	
yes	51	18			16	
Estimated blood loss			10.613	0.001		11.984 0.001
<400mL	202	38			36	
≥400mL	68	26			26	

CDC=Clavien-Dindo classification; CCI=comprehensive complication index; ACCI=age-adjusted Charlson comorbidity index; ASA=American Society of Anesthesiologists; BMI=body mass index. 1:fisher exact method

Table 3. Multivariate cox analysis for CDC ≥ 3				
Variables	Wald	OR	95%CI	P
BMI	6.250	2.474	1.216-5.032	0.012
Preoperative albumin	3.214	0.508	0.242-1.065	0.730
pT	0.560	0.547	0.113-2.654	0.454
pN	0.805	1.692	0.536-5.340	0.369
pTNM	1.429	2.885	0.508-16.393	0.232
Intraoperative blood transfusion	0.230	1.067	0.464-2.453	0.879
Estimated blood loss	7.779	2.862	1.367-5.992	0.005

BMI=body mass index

Table 4. Multivariate cox analysis of CCI>33.7

Variables	Wald	OR	95%CI	P
Hydronephrosis	3.772	2.017	0.994-4.095	0.052
BMI	8.083	3.031	1.411-6.510	0.004
pT	0.437	0.586	0.120-2.854	0.509
pN	0.427	1.466	0.465-4.622	0.514
pTNM	2.162	3.715	0.646-21.361	0.141
Operative time	2.189	1.627	0.854-3.100	0.139
Estimated blood loss	9.943	2.904	1.497-5.634	0.002

BMI=body mass index

Figures

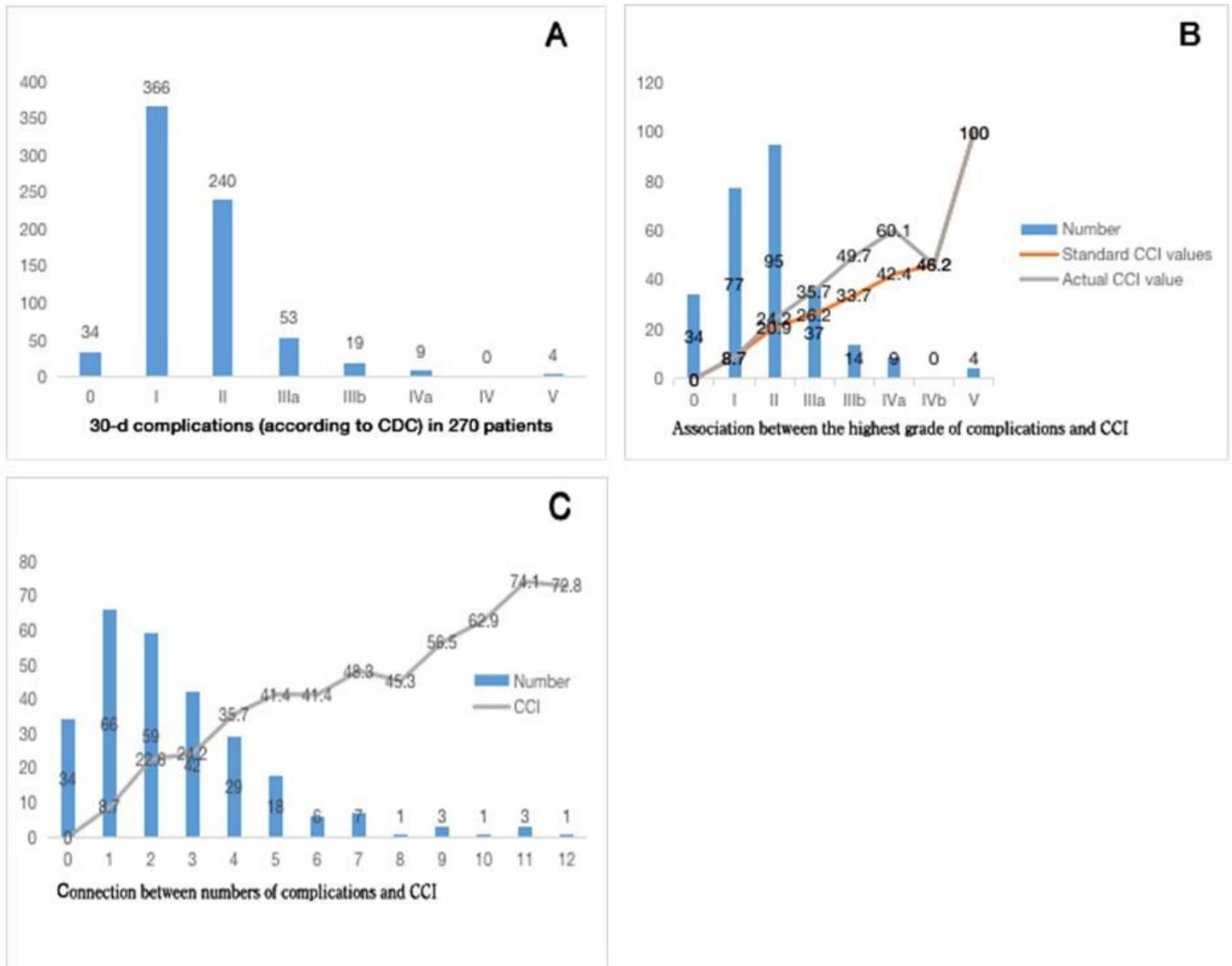


Figure 1

(A) Graph diagram presenting all 30-d complications (according to CDC) in 270 patients. (B) Diagram exhibiting the association between the highest CDC grade of 30-d complications and CCI. (C) Chart showing the connection between numbers of complications and CCI. CDC= Clavien-Dindo classification CCI= comprehensive complication index

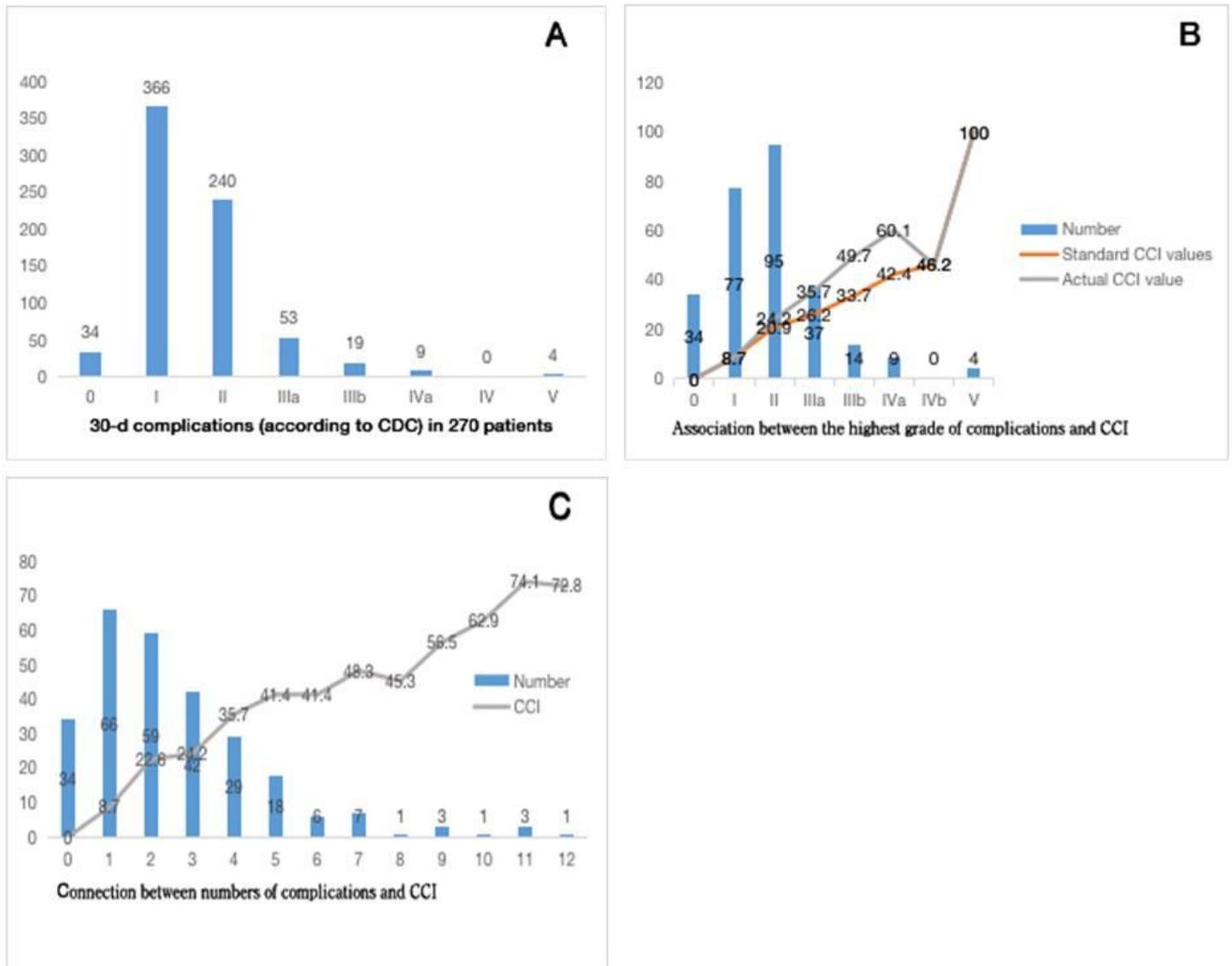


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