

# A Clinical Control Study on the Retroperitoneal Laparoscopy for Unilateral Simple Renal Cyst Decortication in the Day Ward

**Xiao-Liang Zhu**

Wenzhou Medical University First Affiliated Hospital

**Yasmeen Bano**

Wenzhou Medical University First Affiliated Hospital

**song-jiang wu**

Taizhou Hospital of Zhejiang Province

**Hai-Hong Jiang** (✉ [jianghh.md@foxmail.com](mailto:jianghh.md@foxmail.com))

<https://orcid.org/0000-0002-0116-052X>

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## Research article

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# Abstract

## Background

Under the constraints of the increasingly tight medical environment and market economy, day surgery has a good development trend and attracts more and more attention from clinicians. To investigate the feasibility and safety of unilateral simple renal cyst decortication by retroperitoneal laparoscopy in the day ward and to compare the advantages and disadvantages of conventional inpatient ward.

## Methods

A total of 41 patients with unilateral simple renal cysts meeting surgical indications were included in this study. The patients were divided into the day ward group and inpatient ward group by the patients' wishes. The indexes of operation time, time of hospitalization, intraoperative blood loss, time of postoperative extubation, postoperative complication rate, patients' satisfaction rate, quality of life scores and total costs of hospitalization were compared between the two groups.

## Results

41 cases of unilateral simple renal cyst decortication were completed successfully. Patients were followed up 10–12 months after surgery. CT or b-ultrasound examination indicated that the original renal cyst had been decorticated surgically and no recurrence of the cyst was observed after 10 months of postoperative follow-up. Time of postoperative extubation were  $(9.7 \pm 1.8)$  hours and  $(20.8 \pm 5.5)$  hours, total hospitalization costs were  $(5790 \pm 99.8)$  RMB and  $(7496 \pm 120.6)$  RMB, time of hospitalization were  $(22.7 \pm 1.4)$  hours and  $(46.4 \pm 11.3)$  hours in the day ward group and the inpatient ward group, respectively. In the above three aspects, the differences between the two groups were statistically significant ( $P < 0.05$ ).

## Conclusion

In this study, we concluded that the retroperitoneal laparoscopy for unilateral simple renal cyst decortication in patients aged between 48 and 80 years, with no previous history of abdominal surgery, unilateral renal cysts (Bosniak grades I or II) on CT, ASA grades I or II, and no surgical or anesthetic contraindications, was safe and feasible in the day ward. Its obvious advantages of reducing time of hospitalization and total costs of hospitalization were worthy of clinical promotion.

## 1. Background

The concept of day ward surgery was first proposed by James Nicoll, a famous British pediatric surgeon in 1909. It was defined as selecting the appropriate patients to complete hospitalization, surgery, short-term observation, recovery and discharge after 1 working day [1]. The United States established its first independent ambulatory surgery center in 1970, and many other countries began to promote ambulatory surgery. The International Association for Ambulatory Surgery (IAAS) defined day surgery in 2003 as a procedure performed by a patient on admission, surgery, and discharge in one working day, excluding doctor-type clinics or hospital outpatient-type surgeries [2]. For the surgical treatment of renal cysts, most domestic hospitals in China adopted laparoscopic renal cyst decortication surgery in the inpatient ward mode, which had the disadvantages of long hospital stay and high hospital-related costs. Currently, there is no clinical control study on the operation of renal cyst in the day ward

model, so it is of clinical significance to explore its feasibility, safety and comparison with traditional model. Therefore, we conducted this single-center case-control study. In accordance with the criteria for inclusion, patients with unilateral simple renal cysts who were to undergo surgery were compared in the day ward versus inpatient ward mode.

## 2. Methods

### 2.1. Study population

During the period of 15 January 2018 solstice 15 March 2019, 49 patients with renal cyst with surgical indications were enrolled in the outpatient department. After 8 patients were excluded according to the exclusion criteria, a total of 41 patients were included in this clinical control study. The whole process was shown in flow diagram of study design and participants (Fig. 1). According to the patients' wishes, they were randomly divided into day ward group (19 cases) and inpatient ward group (22 cases). The patients of day ward group completed all preoperative examinations in the outpatient department and completed admission, operation and discharge within 24 hours. The surgical indication was that the maximum diameter of simple renal cyst was more than 4 centimeter and there was obvious renal parenchyma compression and damage on imaging, or there were clinical symptoms such as waist swelling, hematuria and so on. Exclusion criteria: ☐ Age > 80 years. ☐ A history of previous abdominal surgery. ☐ Preoperative American Society of Anesthesiologists(ASA) grade was III or IV, or contraindications to surgery or anesthesia. ☐ Imaging suggested renal cysts on both sides. ☐The Bosniak grade in imaging was III or IV. Inclusion criteria were summarized according to 41 patients: age between 48 and 80 years; no previous history of abdominal surgery; unilateral renal cysts (Bosniak I or II) on Computed Tomography (CT); preoperative ASA grade I or II; no significant surgical or anaesthetic contraindications.

### 2.2. Preoperative examination

All selected patients completed the following examinations: ☐ laboratory tests: blood routine, blood type, clotting function, complete biochemistry, tumor series, Human Immunodeficiency Virus (HIV) syphilis, hepatitis B, hepatitis C, urinary routine, fecal routine; ☐ imaging tests: urological ultrasound, CT enhancement and chest X-ray; ☐ other tests: electrocardiogram; ☐ special tests: cardiopulmonary function and lower limb vascular ultrasound if the patient was older than 60 years. Patients in the day ward group completed the above examinations in the outpatient department, and the outpatient anesthesiologist assessed the ASA grade. The inpatient ward group completed the above examination within 3 days after admission according to the usual work procedure, and also underwent preoperative ASA grading evaluation.

### 2.3. Surgical methods

All operations were performed by the same surgeon with 15 years of clinical experience. General anesthesia was performed by endotracheal intubation. We divided the detailed surgical procedure into 6 steps as follows: step1: the patient was placed in the lateral position, followed by the establishment of three trocar positions. Step 2: the sizes of 10 mm Trocar, 10 mm Trocar, and 5 mm Trocar were placed at three different puncture points. The first puncture point was located at a transverse incision of 1.0 ~ 1.5 cm under the twelve costal margin of the posterior axillary line. Then the lumbar dorsal fascia is obtuse by vascular forceps to separate into the retroperitoneal space, and then the extension of local space is carried out with dexterous fingers, in which excessive tearing of the peritoneum is prevented. This puncture site was used to place a 10 mm Trocar. The second puncture point was

located at a transverse incision of 1.0 ~ 1.5 cm above the iliac crest in the middle axillary line, and a 10 mm Trocar was placed for the placement of the observation lens. The third puncture point was located under the costal margin of the axillary front line. A transverse incision of about 0.5 cm was made and a 5 mm Trocar was placed. Step3: After the above operation, CO<sub>2</sub> was injected into the retroperitoneal cavity to establish the artificial pneumoperitoneum. Step4: Through the trocar, we carefully and clearly identified the psoas major, peritoneal reflex, perirenal fat sac and other anatomical markers. The perirenal fascia was cut open by electric coagulation, and the fat sac of the kidney was tested by electric coagulation to understand the position and general outline of the kidney. Finally, the location of the cyst was determined by combining with imaging, and the renal fat sac was cut open by electrocoagulation at the corresponding cyst location, then the cyst was cut open and the cyst fluid was sucked clean. The capsule wall was lifted and removed approximately 5 mm from the edge of the renal parenchyma. Electrocoagulation was performed at the edge of the incision. The renal cystic space was filled with perirenal adipose tissue. Step5: After observation of no obvious bleeding, a drainage tube with negative pressure was placed around the kidney to be extracted from the second puncture channel. After removing the gas from the abdominal cavity, the puncture hole was sutured. Step6: The wall of renal cyst was removed for pathological examination.

## 2.4. Histopathology

All tissue specimens were submitted for histopathological examination. All pathological examination results were benign walls of renal cyst.

## 2.5. Discharge assessment and criteria

Patients were evaluated by the surgeon, anesthesiologist, and nurse for postoperative pain, drainage of the dermal tube, and recovery of bowel function. All patients were discharged from the hospital with the following criteria: ☐ the patient's intestinal function was restored, the patient's anus was ventilated, there was no discomfort after eating semi-fluid food, and he/she could move out of bed on his/her own; ☐ the patient's vital signs were stable, the abdomen was flat and soft, there was no obvious pressure pain or muscle tension; ☐ there was no obvious decrease in hematocrit on blood tests and no obvious perirenal effusion on CT; ☐ the drainage tube was removed before discharge and there were no significant postoperative complications; ☐ the patient was accompanied by an adult family member after surgery.

## 2.6. Collection of clinical related data

The clinical characteristics, imaging characteristics, surgery-related data and the follow-up data of 41 patients were collected. Focus on comparison between the two groups of operation time (time from skin incision to skin closure) (minute), time of hospitalization (hour), intraoperative blood loss (blood loss were counted by surgeon and anesthesiologist) (milliliter), time of postoperative extubation (time from patient's return to the ward after surgery to time of extubation) (hour), the incidence of postoperative complications (incision exudation, incision infection and urinary tract infection) (%), total costs of hospitalization (RMB), the postoperative patients' satisfaction rate (%), preoperative and postoperative patients' quality of life scores, renal cyst recurrence after surgery, etc.

## 2.7. Collection of follow-up data

All patients were planned to be followed up 1 year after surgery. The follow-up content included the collection of imaging data of renal cyst, the observation of the surgical effect of renal cyst (recurrence of cysts and remission of hydrocele, etc.), and the completion of questionnaires on quality of life and satisfaction rate, etc.

## 2.8. Statistical analysis

Statistical software spss19.0 was used for statistical calculation. Mean  $\pm$  standard deviation ( $\bar{x} \pm s$ ), n (%), n/ N (%) were used to represent the data. The T test was used for data of measurement and the  $\chi^2$  test was used for data of count. When  $P < 0.05$ , the difference was considered to be significant and statistically significant.

## 3. Results

### 3.1. Results of patients' clinical data

The data collected from 41 patients included: clinical characteristics (table 1), Imaging characteristics (table 2), the surgery-related data (table 3), and the follow-up data (table 4). The figure and tables were completed by Microsoft Office PowerPoint. The preoperative imaging findings of 41 patients indicated that the maximum diameter of all renal cysts were more than 4 cm, accompanied by varying degrees of renal parenchyma compression and damage. Among them, imaging analysis revealed mild hydronephrosis in 3 (7%) patients with renal cysts, 34 (83%) of Bosniak I patients and 7 (17%) of Bosniak II patients. In both groups, unilateral simple renal cysts were decorticated successfully under retroperitoneal laparoscopy. No open surgery or major bleeding occurred during the operation. One patient's cystic fluid was cloudy, and the remaining patients' cystic fluid was clear. After the operation, the drainage tubes were removed and all patients discharged without serious complications such as urine leakage, massive bleeding and so on.

Table 1  
Clinical characteristics of 41 surgical patients

Clinical characteristics	All patients (N=41)	Day ward group (n=19)	Inpatient ward group (n=22)	P value
Age, years( $\bar{x} \pm s$ )	57.4 $\pm$ 5.8	57.5 $\pm$ 5.8	57.4 $\pm$ 6.0	0.59
Sex				
male	24(58%)	14(74%)	10(45%)	
female	17(42%)	5(26%)	12(55%)	
Clinical symptoms				
waist swelling	10(24%)	6(32%)	4(18%)	0.53
hematuria	4(9%)	2(11%)	2(9%)	1.00
Any comorbidity				
hypertension	8(20%)	3(16%)	5(23%)	0.87
diabetes	3(7%)	2(11%)	1(5%)	0.90
cardiovascular disease	5(12%)	2(11%)	3(14%)	1.00
orala spirin or clopidogrel	6(15%)	3(16%)	3(14%)	1.00

Data were presented as mean  $\pm$  standard deviation ( $\bar{x} \pm s$ ), n (%), or n / N (%), where N were the total number of patients with available data. The p-value of the operation in the day ward group and the Inpatient ward group were compared with the  $\chi^2$  and t tests.

Table 2  
Imaging characteristics of 41 surgical patients

Imaging characteristics	All patients	Day ward group	Inpatient ward group	P value
	(N=41)	(n=19)	(n=22)	
The location of the renal cyst				
in the left	24(59%)	14(74%)	10(45%)	
in the right	17(41%)	5(26%)	12(55%)	
in upper middle	16(39%)	9(47%)	7(32%)	
in inferior	25(61%)	10(53%)	15(68%)	
Maximum diameter of renal cyst (cm)	5.8±1.0	5.7±1.0	5.7±1.2	0.64
Renal cyst with mild hydronephrosis	3(7%)	1(5%)	2(9%)	1.00
Renal cyst Bosniak classification				
grade I	34(83%)	15(79%)	19(86%)	0.83
grade II	7(17%)	4(21%)	3(14%)	0.83

Data were presented as mean ± standard deviation ( $\bar{x} \pm s$ ), n (%) or n / N (%), where N were the total number of patients with available data. Maximum cyst diameter measured in CT images. The p-value of the operation in the day ward group and the Inpatient ward group were compared with the  $\chi^2$  and t tests.

Table 3  
The surgery-related data of 41 surgical patients

	All patients	Day ward group	Inpatient ward group	P value
	(N=41)	(n=19)	(n=22)	
Operation time (minutes)	49.1±7.2	47.3±6.1	50.8±7.8	0.51
Intraoperative blood loss (milliliter)	12.3±4.9	11.4±4.5	13.0±5.2	0.65
Time of postoperative extubation (hours)	15.7±7.0	9.7±1.8	20.8±5.5	0.00
Time of hospitalization (hours)	35.4±14.5	22.7±1.4	46.4±11.3	0.00
Postoperative concurrency rate (%)	4(9%)	2(10%)	2(9%)	1.00
case of incision exudations	2(5%)	1(5%)	1(5%)	
case of incision infections	1(2%)	1(5%)	0(0%)	
case of urinary tract infections	1(2%)	0(0%)	1(5%)	
Total costs of hospitalization(RMB)	6705.4±997.8	5790±99.8	7496±120.6	0.03
Data were presented as mean ± standard deviation ( $\bar{x} \pm s$ ), n (%), or n / N (%), where N were the total number of patients with available data. The p-value of the operation in the day ward group and the Inpatient ward group were compared with the $\chi^2$ and t tests. The standard of incision exudation: more than 5 pieces of gauze exudation and more than 3 times of dressing change.				

Table 4  
The follow-up data of 41 surgical patients

	All patients	Day ward group	Inpatient ward group	P value
	(N=41)	(n=19)	(n=22)	
Preoperative quality of life scores	31.9±3.6	32.2±3.7	31.8±3.6	0.98
Postoperative quality of life scores(2 weeks after surgery)	38.2±5.3	38.1±5.5	38.3±5.2	0.52
Satisfaction rate(2 weeks after Surgery) (%)	38(93%)	17(89%)	21(95%)	0.9
Imaging examination of renal cyst Recurrence rate (10 months after surgery)	0(0%)	0(0%)	0(0%)	
Data were presented as n (%) or n / N (%), where N were the total number of patients with available data. The p-value of the operation in the day ward group and the Inpatient ward group were compared with the $\chi^2$ and t tests. The evaluation method of the satisfaction rate survey results was satisfaction or dissatisfaction. The quality of life score (QOL) was based on the quality of life scale of domestic tumor patients in 1990, with a full scores of 60.				

The mean maximum diameter of renal cysts were  $(5.7 \pm 1.0)$  centimeter and  $(5.7 \pm 1.2)$  centimeter (cm), preoperative renal cyst Bosniak grade I were 15 cases(79%) and 19 cases(86%), renal cyst Bosniak grade II were 4 cases(21%) and 3 cases(14%), the mean operation time were  $(47.3 \pm 6.1)$  minutes and  $(50.8 \pm 7.8)$  minutes, the mean intraoperative blood loss were  $(11.4 \pm 4.5)$  milliliter and  $(13.0 \pm 5.2)$  milliliter, the postoperative complications were 2 cases(10%) and 2 cases (9%),respectively. In the above statistics, there was no statistically significant difference between the day ward group and the inpatient ward group ( $P > 0.05$ ). The mean time of postoperative extubation were  $(9.7 \pm 1.8)$  hours and  $(20.8 \pm 5.5)$  hours, the mean total costs of hospitalization were  $(5790 \pm 99.8)$  RMB and  $(7496 \pm 120.6)$  RMB, the mean time of hospitalization were  $(22.7 \pm 1.4)$  hours and  $(46.4 \pm 11.3)$  hours in the day ward group and the inpatient ward group, respectively. In the above three aspects, the differences between the two groups were statistically significant ( $P < 0.05$ ).

## 3.2. Results of surgical complications

Complications occurred in a total of 4 (9%) patients. Postoperative incision exudation was significant in 2 (5%) patients, excluding patients with incision infection. All incisions healed after 5–7 times of gauze replacement. We used gauze exudation of more than 5 pieces and dressing changes of more than 3 times as the standard for obvious postoperative incision exudation. Postoperative incision infection occurred in 1(2%) patient. We collected incision secretions and cultured staphylococcus aureus later. The patient improved after outpatient dressing change and oral antibiotic treatment. Postoperative urinary tract infection occurred in 1 (2%) patient. The clinical manifestations of the patient were frequent urination, urgent urination, painful urination and the routine urinalysis showed white blood cell ++. We collected urine culture, but there was no positive result. According to clinical experience, the patient was instructed to pay attention to a large amount of water and take oral Chinese patent medicine 2 weeks for symptom treatment. The patient's symptoms were relieved and the urine routine was negative.

## 3.3. Results of postoperative follow-up

After the operation, CT or B ultrasound was used to observe the change of hydronephrosis and the recurrence of renal cyst in the outpatient department. Thirty-seven patients were followed up for 12 months after operation, and four patients lost contact after 10 months after operation. At the end of the 10-month follow-up, all the patients underwent CT or b-ultrasound reexamination, indicating that the original renal cyst had been surgically decorticated and no recurrence of the cyst was observed. The patients' satisfaction rate at 2 weeks after surgery were 17 (89%) and 21 cases (95%), the mean quality of life scores at 2 weeks after surgery were  $(38.1 \pm 5.5)$  and  $(38.3 \pm 5.2)$ .In terms of satisfaction rate and quality of life (QOL) at 2 weeks after the operation, the inpatient ward group was higher than the day ward group, but there was no significant difference. In addition, b-mode ultrasound reexamination 2 weeks after the operation indicated that all 3 patients with renal cyst with mild hydronephrosis were relieved. All the 10 patients with preoperative waist swelling were relieved by postoperative follow-up of about 3 months. According to the routine urine reexamination in the outpatient clinic after the surgery, the hematuria symptoms disappeared in 3 of the 4 patients with preoperative hematuria. During the follow-up of the remaining patient, the urine routine continued to indicate urinary occult blood ++. We performed exfoliating cytology but found no suspicious malignant cells. The patient refused further invasive examinations such as cystoscopy, who still under observation in the outpatient clinic.

## 4. Discussion

With the continuous development of imaging technology, more and more renal cysts have been found in the population [3, 4]. Renal cysts are very common in urology. Most patients with renal cysts are asymptomatic. Only a few patients have symptoms such as pain, hypertension, hematuria, recurrent urinary tract infection, and cyst rupture [5, 6]. According to Bosniak classification, the renal cysts are classified as simple cysts (Bosniak grade I and II) or complex cysts (Bosniak grade III and grade IV). At present, most scholars at home and abroad believe that for patients with simple renal cyst (Bosniak grade I and grade II), if the maximum diameter of cyst is less than 4 cm and there are no obvious clinical symptoms, the patient should be followed up regularly for reexamination. If the maximum diameter of the renal cyst is more than 4 cm and there is obvious renal parenchymal damage on imaging, or there are clinical symptoms of and hematuria, the patient should be treated actively. The aim is to prevent further progression of the disease and further damage to kidney function. At present, there are many treatment methods, such as ultrasound-guided puncture drainage + hardener injection [7], traditional open decortication renal cyst surgery, laparoscopic decortication renal cyst surgery, flexible ureteroscopic management of renal cyst [8, 9] and percutaneous decortication renal cyst surgery [10]. Laparoscopic renal cyst decortication with less trauma, faster recovery and better efficacy is the preferred method for the treatment of simple renal cyst, especially for the younger patients with large cysts [11]. A comparative study between the retroperitoneal approach and the peritoneal approach showed that the retroperitoneal approach had significantly shorter operative time than the retroperitoneal approach, which reduced the interference to the intestinal tract and significantly shortened the recovery time of intestinal function [12]. In the case of cyst co-infection, the chance of peritoneal dissemination could also be reduced [13, 14]. The disadvantages are that the operation space is small, the bilateral renal cyst cannot be treated at the same time, the peritoneum is easy to be injured and the operation technique requirements are high.

To make full use of limited bed resources and to provide more patients with efficient medical services, the national health administration department of China is continuously promoting day surgery through relevant quantitative indicators. The investigation found that general surgery, gynecology, orthopedics, urology and vascular surgery in our hospital have been performing day surgery. There have been many kinds of urological surgery performed in the day ward mode, including lithotripsy (soft) mirror ureter, bladder calculi lithotripsy, urethra stone lithotripsy, urethra meat with resection, occult penis orthopedics, cryptorchidism by fixation, stress urinary incontinence, etc. An analysis of risk factors for catheter-related urinary tract infections found that each additional day of catheter retention increased the risk of urinary tract infections [15]. Since the hospital stay in the day ward mode does not exceed 24 hours, reducing the indwelling time of urinary catheters can further increase the turnover rate of patients when they are admitted to the hospital, and also greatly reduce the incidence of nosocomial infections. If postoperative infection occurs, in order to better select the appropriate antibiotic application, it is recommended that clinicians collect secretions and send them to bacterial culture as much as possible. Selection of appropriate patients, adequate preoperative assessment and related preparation are still important prerequisites for the success of daytime surgery [16, 17]. The results of this study showed that there was no significant difference between the inpatient group and the day group in terms of surgical effect (operation time, intraoperative blood loss, 10 months of postoperative follow-up for renal cyst recurrence), postoperative complication rate, postoperative quality of life score, and postoperative satisfaction rate. However, the total hospitalization time of patients in the day ward group is shortened to within 24 hours, and the time of postoperative drainage tube indwelling is also significantly shortened, which effectively reduces the medical expenses and saves health resources. But obviously, this study was a single-center study with a small sample size and all cases were cases of unilateral renal cyst. Therefore, bilateral renal cyst surgery could not be performed at the same time. Thus not all patients with surgically-indicated renal cysts could benefit in the day ward mode. We believe that in the future, with the

development of medical technology and the accumulation of clinical practice, the indications for the inclusion of renal cysts in ambulatory surgery may be further broadened. With the development of the concept of accelerated rehabilitation surgery and postoperative pain-free surgery, the ambulatory surgery model has been widely carried out in the clinic with its simplified and standard diagnosis and treatment procedures, and has become an effective means to relieve the shortage of medical resource [18, 19].

This was a retrospective, single-center, case-control clinical study. Based on the literature and the results of this study, we summarized the characteristics and requirements of laparoscopic decortication for unilateral simple renal cyst in the day ward model in the following aspects: ☒ The outpatient doctor needed to strictly master the surgical indications of simple renal cyst. ☒ The patient with preoperative ASA assessment was I or ☒. There were no obvious contraindications of operation and anesthesia. ☒ The location, size and number of renal cysts as well as the relationship between renal cysts and peripheral vessels and renal collecting system were determined by preoperative b-ultrasound and CT examination. Meanwhile, Bosniak grade was conducted according to CT. ☒ The distance between puncture points in retroperitoneal surgery should be moderate to avoid affecting the operation of intraoperative instruments and extending the operation time. ☒ Without water capsule dilation, the position of the kidney did not change much. The surgeon should carefully dissect the layers of tissue surrounding the kidney. When the renal fascia was opened near the psoas major, the avascular area of the renal fascia was clearly visible. Along this vascularized area, the renal fascia fully dissociated the dorsal kidney and revealed the renal contour. At the same time, combined with preoperative imaging, the surgeon determined the location of intraoperative renal cyst. A few renal fat sacs were incised at the site of the cyst and to reveal a blue-purple cyst. Then the capsule fluid was sucked away and the capsule wall was removed [20, 21]. ☒ The competent doctors and nurses timely assessed the degree of postoperative pain, the recovery degree of intestinal function and the number of postoperative drainage, helping the patients successfully complete the 24-hour admission.

In summary, we recommended that retroperitoneal laparoscopic unilateral simple renal cyst decortication was safe and feasible in the day ward model for patients who were eligible for the conditions of inclusion criteria. It helped to reduce the consumption of medical resources, reduce nosocomial infections and reduce intravenous fluids. Day surgery is considered to be a high-quality, safe and cost-effective surgical method, which requires clinicians continuously explore and accumulate evidence of evidence based medicine through more clinical practice, to improve medical safety and quality and reduce medical costs, so as to benefit more patients. In addition, for the current prevention and control of the spread of COVID-19, day surgery is also a good choice for patients.

## 5. Conclusion

With the continuous progress of minimally invasive techniques in clinical surgery, as well as the application of painless concept and rapid rehabilitation, ambulatory surgery is one of the inevitable trends in the future. In this study, we concluded that the retroperitoneal laparoscopy for unilateral simple renal cyst decortication in patients aged between 48 and 80 years, with no previous history of abdominal surgery, unilateral renal cysts (Bosniak grades I or II) on CT, ASA grades I or II, and no surgical or anesthetic contraindications, was safe and feasible in the day ward. Its obvious advantages of reducing time of hospitalization and total costs of hospitalization were worthy of clinical promotion.

## Abbreviations

ASA: American Society of Anesthesiologists; IAAS:International Association for Ambulatory Surgery; CT:Computed Tomography; QOL:Quality Of Life; HIV:Human Immunodeficiency Virus; CM:centimeter; COVID-19:Corona Virus Disease 2019.

## **Declarations**

## **Ethics approval and consent to participate**

Local ethics committees (The First Affiliated Hospital of Wenzhou Medical University and Taizhou Enze Medical Center (Group) Enze Hospital, China) approval were obtained to conduct this study. All of the patients gave informed consent before undergoing the operation. The principles of the Helsinki Declaration were followed in this study.

## **Consent for publication**

Not applicable.

## **Availability of data and materials**

Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

## **Competing interests**

The authors declare that they have no competing interests.

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## **Authors' contributions**

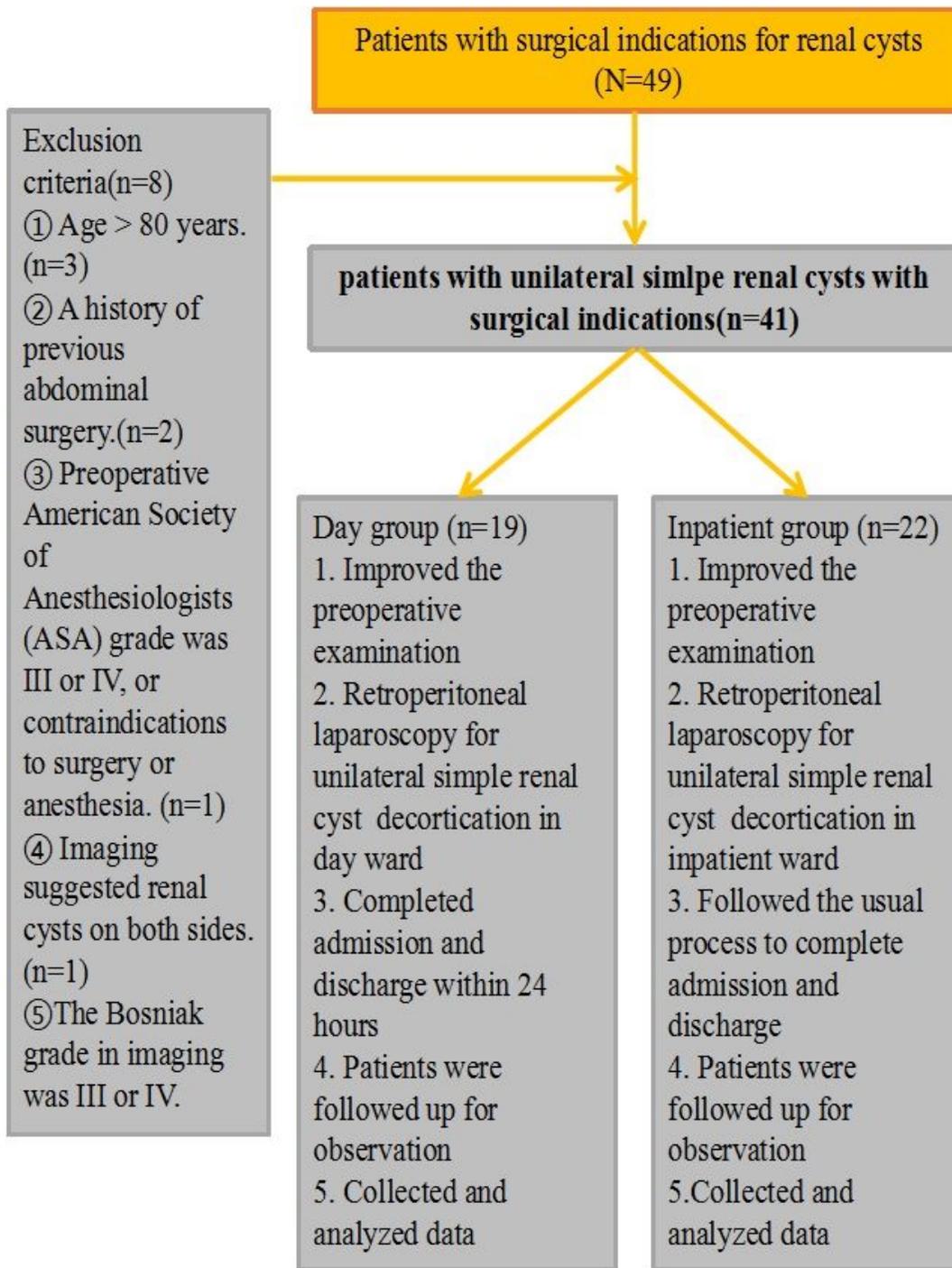
H-HJ, X-LZ and S-JW had roles in the study design, patient recruitment, data collection, data analysis, data interpretation, literature search, and writing of the manuscript. YB and X-LZ had roles in data collection, data analysis, and data interpretation. H-HJ contributed to critical revision of the manuscript. All authors contributed to data acquisition, data analysis, data interpretation, and reviewed and approved the final version.

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## Figures



**Figure 1**

Flow diagram of study design and participants.