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KEY WORDS: Inflammatory renal diseases, laparoscopic nephrectomy and Minimally invasive surgery.

MINIMALLY INVASIVE NEPHRECTOMY FOR INFLAMMATORY RENAL DISEASE IN A TERTIARY CARE INSTITUTE OF MANGALORE.

Dr U Chowdary Panchumarthi Department of Urology, AJIMS, Mangalore, Karnataka, India.

Dr Akash Bande* Department of Urology, AJIMS, Mangalore, Karnataka, India. *Corresponding Author

Dr Yogendra Chidrawar Department of Urology, AJIMS, Mangalore, Karnataka, India.

ABSTRACT

Background: Inflammatory renal diseases (IRD), due to their technical difficulty, were considered as relative contra-indications to the laparoscopic procedure by the first series in the literature. Due to the significant inflammatory process, the difficult dissection of the renal pedicle and adhesions to adjacent organs, makes this operation a technically demanding approach for minimally invasive surgery (MIS).

Methods: In this study, we retrospectively reviewed the records of 68 patients who underwent a Laparoscopic Nephrectomy (LN) for IRD in a tertiary-care centre between January 2014 and November 2020. Included cases were the following: Interstitial nephritis, chronic pyelonephritis, renal tuberculosis and xanthogranulomatous pyelonephritis.

Results: In this study 68 patients with IRD underwent LN out of which 8 converted to open. The mean operative time for patients who did not required conversion to open surgery was 192 +/- 104 min, for the conversion ones was 380 +/- 180 min and for all the 68 patients was 214 +/- 116 min. The mean estimated blood loss for patients who did not required conversion to open surgery was 240 +/- 288 mL, for the conversion ones was 1684 +/- 940 mL and for all the patients was 396 +/- 388 mL. The mean length of hospital stay after surgery was 4.6 +/- 2.0 days, being longer for the converted ones compared to the no converted ones (7.8 +/- 2.8 days vs. 3.0 +/- 1.8 days),

Conclusions: Laparoscopic nephrectomy for IRD can safely be done. It is a reproducible technique with low risks and complication rates despite the surgical challenge it represents.

INTRODUCTION

The laparoscopic nephrectomy was first described by Clayman in 1990 (1). Inflammatory renal diseases (IRD), due to their technical difficulty, were considered as relative contra-indications to the laparoscopic procedure by the first series in the literature (2). In the past decades, the open nephrectomy has been considered as the standard of care for this condition. However, this approach is related to wide, painful incisions with higher risk of surgical site infections, higher analgesic dose requirements, longer hospital stays and prolonged convalescence periods (3,4). Due to the significant inflammatory process, the difficult dissection of the renal pedicle and adhesions to adjacent organs, makes this operation a technically demanding approach for minimally invasive surgery (MIS).

According to Robson's surgical description, the renal hilum should be approached before perirenal or ureteric dissection is performed, however we want to present our experience treating patients with IRD who benefit from a different surgical technique. Hereby we present a modified surgical approach where we start dissection outside Gerota's fascia leaving the hilum to the end (5,6).

METHODS

In this study, we retrospectively reviewed the records of 68 patients who underwent a Laparoscopic Nephrectomy (LN) for IRD in a tertiary-care center between January 2014 and November 2020. Included cases were the following: Interstitial nephritis, chronic pyelonephritis, renal tuberculosis and xanthogranulomatous pyelonephritis. Medical records of all patients were reviewed. The analyzed variables included patient's demographics, preoperative diagnosis based on images (computed tomography [CT], magnetic resonance imaging [MRI], ultrasound and/or renal scintigraphy), and intraoperative variables such as operative time, blood loss, need for open conversion, length of hospital stay, postoperative complications.

After data collection, we calculated the mean and standard deviation of the operative time, blood loss and length of hospital stay for all 68 patients, including both, those who required conversion and those who did not. Then, we did the same statistical analysis excluding patients with conversion to open surgery. Following this, we obtained the percentage of patients with mild and severe postoperative complications.

RESULTS

We included 68 patients with any IRD in the histopathology report who underwent modified-laparoscopic nephrectomy technique. Our study had 29 male patients and 39 female patients, which included 42 left and 26 right nephrectomies.

Table 1 Demographic data of patients with inflammatory renal disease.

Demographic data	Number of patients
Gender	
Male	29
Female	39
Side	
Left	42
Right	26

In our study a positive history of urolithiasis was present in 32 cases, urinary tract infections (UTI) in 28 cases, high blood pressure (HBP) in 20 cases, Type II diabetes mellitus (DM II) in 33 cases, vesicoureteral reflux (VUR) in 2 cases, Renal TB in 4 cases and Primary obstructive megaureter in 1 case.

Table 2 Personal history of patients with inflammatory renal disease.

Personal history	Number of cases
Urolithiasis	32
UTI	28
HBP	20
DM	33
VUR	2
Renal TB	4
Primary obstructive megaureter	1

In our study 8 (11.67%) cases had mild post-operative complications and 6 (8.82%) cases had severe post-operative

complications. Post-operative pneumonia seen in 3 cases, Plural effusion seen in 3 cases, Acute myocardial infraction (AMI) seen in 1 case, Pulmonary thromboembolism (PTE) seen in 2 cases, wound dehiscence seen in 1 case, surgical site infection (SSI) seen in 2 cases and ileus seen in 2 cases.

Table 3 Post-operative complications

Post-operative complications	Number of cases
Post-operative pneumonia	3
Plural effusion	3
AMI	1
PTE	2
Wound dehiscence	1
SSI	2
Ileus	2

In our study 8 cases converted to open 6 cases due to vascular injury, 1 case due to diaphragmatic injury and 1 case due to colonic perforation. The total conversion rate to open surgery was 11.67%.

The mean operative time for patients who did not required conversion to open surgery was 192 +/- 104 min, for the conversion ones was 380 +/- 180 min and for all the 68 patients was 214 +/- 116 min, ranging between 100 min and 710 min. The mean estimated blood loss for patients who did not required conversion to open surgery was 240 +/- 288 mL, for the conversion ones was 1684 +/- 940 mL and for all the patients was 396 +/- 388 mL. The mean length of hospital stay after surgery was 4.6 +/- 2.0 days, being longer for the converted ones compared to the no converted ones (7.8 +/- 2.8 days vs. 3.0 +/- 1.8 days), ranged between 2 and 16 days.

Parameter	No conversion to open surgery, n=60 (88.23%)	Conversion to open surgery, n=8 (11.67%)	Mean of total
Operative time, mean +/- SD, min	192 +/- 104	380 +/- 180	214 +/- 116 min
Estimated blood loss, mean +/- SD, mL	240 +/- 288	1684 +/- 940	396 +/- 388
Days hospitalized, mean +/- SD, day	3.0 +/- 1.8	7.8 +/- 2.8	4.6 +/- 2.0

DISCUSSION

The inflammatory renal conditions develop an inflammation process compromising the renal parenchyma and adjacent renal structures. In our study demographic data reported highlight the predominance of these diseases in women, described also in other publications (7,8). The common comorbidities were urolithiasis, UTI and DM reported in the literature (7 – 9).

The nephrectomy is the first line of treatment for a chronic non-functioning inflammatory kidney disease, especially when patients present severe lumbar pain, recurrent urinary tract infections or renovascular hypertension (10). Most recently, surgeons have accumulated a vast experience in laparoscopy, supporting the possibility of performing LN for IRD. However, complications and conversion rates are not uncommon (11). Since Robson's technical description of early vascular control and subsequent dissection of the rest of the kidney, surgeons have continued to perform nephrectomies with this principle (6). In our series we modified this approach and left the hilum for last. Dissection was completed by mobilizing the kidney, usually around Gerota's fascia. Authors who have performed a similar approach have reported a 28% conversion rate due to intraoperative vascular or intestinal injuries (3) higher compared to our study.

In 1998 Doehn et al. (12) reported that there were no significant differences in operative times and complication rates between laparoscopic and open nephroureterectomy in patients with benign renal disease (including IRDs). Additional to this, minimally invasive approach has lower needs of postoperative analgesics, shorter hospital stays, shorter times to achieve full ambulation and faster returns to daily activities (12).

Liang et al. (4) analyzed the experience in LN with a method of outside Gerota's fascia dissection and en-block ligation and division of the renal pedicle similar to our reported cases. They reported 11% of conversions to handassisted laparoscopy and only one conversion to open nephrectomy. Mean operative time was 99.6 +/- 29.2 min, blood loss was 75.2 +/- 83.5 mL and average hospital stay was 4.8 +/- 1.4 days (4). Comparing these results to our study, we had longer operative time and more bleeding, considering the conversion and non-conversion groups. Nonetheless, we had similar conversion rates and our length of hospital stay was similar compared to theirs study. We used a similar laparoscopic technique by beginning with renal release at the lower pole completing the dissection outside Gerota's fascia dissection, then lifting the upper pole preserving the adrenal gland and finally resecting the renal pedicle en-block or dividing them and occluding the vascular structures with Hem-O-Lok vascular clips. These studies are the most recent researches about this topic, concluding both that laparoscopic nephrectomy has minimal mortality in those patients with IRD.

The non-functioning tuberculous kidney was also considered a relative contraindication for LN, not only for its technical difficult dissection, but also because of the high risk of spillage of caseous material into the peritoneal cavity with subsequent dissemination of the disease (13). Nevertheless, in a more recent publication Kim et al. (11) described the experience in 12 patients with renal tuberculosis managed with LN, who presented minor complications and only one conversion. In this study we reported 4 cases of tuberculous pyelonephritic nonfunctioning kidney, with excellent outcomes, no conversion required, no leaking of caseous material and no postoperative complications.

CONCLUSION

Laparoscopic nephrectomy for IRD can safely be done. It is a reproducible technique with low risks and complication rates despite the surgical challenge it represents. Our experience supports that releasing the kidney first and leaving the hilum for the end is a safe approach when vascular structures are embedded into a single block of inflammatory and scar tissue. There were minimal surgical and post-surgical complications, few conversions to open nephrectomy, blood loss, operative time and days hospitalized. As we accumulate clinical experience with laparoscopy, we will decrease even more the morbimortality of this approach in IRD.

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