

Nephrectomy indications from a Tertiary Care Center in Abha, Saudi Arabia: The implications of the paradigm shift

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Abstract

Objectives: The study aims to evaluate if there are changing trends in the indications of nephrectomy in Aseer Central Hospital over the last two decades.

Methods: In a retrospective approach, all patients who underwent nephrectomy from January 2008 to December 2017 in our institute were enrolled. Data were reviewed with regards to clinical presentation, nephrectomy indication, and histopathological report. The results were compared with another study done in the same institute 20 years earlier.

Results: During the 10-year study period, the total number of nephrectomies performed in our institute were 115 cases. The mean age \pm S.D. (years) (51.45 \pm 18.5). 69 (60%) were male and 46 (40%) were female. Flank pain and hematuria were the commonest presentation of 63 (55%) and 31 (27%), respectively. 105 patients (91%) underwent total nephrectomy while 10 patients (9%) underwent partial nephrectomy. Laparoscopic and robotic approach were used in 10 (9%) and 7 (6%) patients, respectively. Non-functioning kidney was the main indication of nephrectomy in 46 patients (40%). Renal cell carcinoma (RCC), however, was the second main indication in 43 patients (37%). All results were compared with the other study done twenty years ago in the same institute.

Conclusion: Although, the non-functioning kidney is still the leading indication of nephrectomy in this series, RCC cases have significantly increased to almost four times what was being reported from this institute over twenty years ago. This mandates immediate and long term health policy planning to address this shift.

Key words: Benign, Indications, Nephrectomy, Renal Tumors, Robotic assisted partial nephrectomy.

Introduction

Kidney can be affected by both neoplastic and non-neoplastic conditions that require nephrectomy. Gustav Simon, in 1869 and 1870, performed planned nephrectomy for urinary fistula and partial nephrectomy for hydronephrosis respectively(1). Non-neoplastic lesions are seen in 90% of nephrectomy specimens removed(2). The first report of transperitoneal laparoscopic nephrectomy was presented by clayman RV et al.(3) in 1991 and retroperitoneal approach using a dissecting balloon was reported by Gaur et al.(4) in 1993. Laparoscopy has emerged as the standard of care for benign renal disease requiring surgical intervention.

In the genitourinary tract, kidney cancer serves as renowned neoplasms and is considered as one of the most common types of cancer among certain patients. Alkhateeb SS et al.(5) indicated that the treatment and diagnosis of the given problem is entirely dependent on the analysis of the cancer stages which includes primary and secondary stages. The first involves the primary tumor and regional lymph node, while later involves metastasis and distant metastasis. The study further illustrated some of the major symptoms that are associated with the given problem including old age, gender, increased blood pressure, diabetes mellitus, smoking, unhealthy diet along with the medical history of any such disease.

The advancement of modern imaging and surgical technologies have provided greater benefits to medical expertise. These techniques, therefore, boosted valuable and greater patient outcomes (6,7). Robotic assisted partial nephrectomy (RPN) technique of treating kidney cancers has gained high level attention in comparison to laparoscopic partial nephrectomy (LPN). This has changed the trends of providing previously established treatments. Seyam et al. illustrated that the RPN serves greater advantages in different surgical dimensions of warm ischemia time (WIT), surgical boundaries, time duration of hospital stay, and other issues related to the perioperative complications (8).

We observed an increased incidence of renal tumors in the last few years. The objective of this study is to determine whether there is changing trends in nephrectomy indications over two periodical intervals in our institute or not. The study will highlight the presentation and different techniques that are routinely performed in Aseer central Hospital, Abha, Saudi Arabia. Furthermore, it should entail adopting recommendations for future healthcare and training plans in our institute.

Methods

A retrospective design was followed in the given study. Medical records of all adult patients who underwent nephrectomy over a ten years period from January 2008 to December 2017 were reviewed. Data extracted included sex, age, clinical presentation, indication for nephrectomy, histopathological report, the surgical approaches, complications and the outcome of our study cohort patients were evaluated.

All adult nephrectomy cases done in our institute over the last ten years were enrolled in this study. The outcome results from this current study are compared with another study done in our institute in the interval between 1987 and 1995.

The data were analyzed using frequency/percentage analysis for the descriptive data. Paired t-test and Chi-square tests were used to compare the variables between the two studies as appropriate. P-value ≤ 0.05 was considered of a statistical significance. IBM Statistical Package for the Social Sciences (SPSS) for Windows (Version 22.0) was used in the analysis.

Results

During the 10-year study period, the total numbers of nephrectomies performed in our institute were 115 adult cases. 69 (60%) patients were males and 46 (40%) were females with a male: female ratio 1.5: 1.0. Flank pain and hematuria were the commonest presentation of 63 (55%) and 31 (27%) patients in this cohort, respectively. Incidental renal tumor, however, was the finding in 9 (9%) patients of the study group. Other symptoms were the presentation in 12 (10%) patients. 105 (91%) patients underwent total nephrectomy while 10 (9%) patients underwent partial nephrectomy. After introduction of the laparoscopy to the institute, it was the mode of therapy in 14 (12%) patients and robotic assisted nephrectomy approach was used in 3 (2.6%) patients. The overall complications were about 5% and were all minor and were managed conservatively. Fortunately, no surgery related death was reported in the whole series (Table 1).

Non-functioning kidney was the main indication of nephrectomy in 46 (40%) patients. Renal cell carcinoma (RCC) was the second leading indication in 43 (37%) patients. Other malignant non-RCC was the diagnosis in 3 (3%) patients. Benign renal tumors were, however, seen only in 7 (6%) patients. 5 (4%) patients had shattered kidney secondary to road traffic accidents-imposed nephrectomy. Other rare indications of nephrectomy were infectious conditions like emphysematous pyelonephritis, transplant nephrectomy for chronic rejection and renal artery aneurysm rupture with retroperitoneal hematoma. They were reported collectively in 11 (9%) patients in this study as illustrated in (Table 2).

Table 1: Demographic and operative parameters of patients in the two studies from our institute

The study interval	The current study (2008- 2017)	El Fadil et al. study (1987- 1995)	p-value
Total No. of nephrectomies	115	85	
Mean age \pm S.D (years)	51.45 \pm 18.5	44 \pm 16	0.08057
Sex			
Male	69 (60%)	56 (66%)	0.242
Female	46 (40%)	29 (34%)	
M/F ratio	1.5:1.0	1.9:1.0	
Presentation:			
Flank pain	63 (55%)	59 (69%)	0.0454*
Hematuria	31 (27%)	14 (17%)	0.09
Incidental	9 (9%)	Not identified	-
Others	12 (10%)	12 (14%)	0.38
Operative procedure:			
Total	105 (91%)	85 (100%)	0.003*
Partial	10 (9%)	0 (00%)	
Laparoscopic	14 (12%)	0 (00%)	-
Robotic	3 (2.6%)	0 (00%)	
Complications:			
Wound infection	4 (3%)	3 (3.5%)	0.84
Pulmonary embolism	2 (1.7%)	1 (1.2%)	0.77
Hemorrhage	1 (0.9%)	1 (1.2%)	0.83
Death	0 (00%)	2 (2.3%)	-

* Significant at 95%

Table 2: The indications of the nephrectomy in the two studies

Results of histopathology	The current Study (115 cases)	Elfadil et al. Study (88 cases)	p-value
Non-functioning kidney	46 (40%)	69 (78%)	0.05*
RCC	43 (37%)	11 (13%)	0.001*
Non-RCC: malignant	3 (3%)	8 (9%)	0.12
Benign renal masses	7 (6%)	Not identified	-----
Shattered kidney RTA	5 (4%)	Not identified	-----
Others	11 (9%)	Not identified	-----

* Significant at 95%

Discussion

Nephrectomy is done for both benign and malignant lesions of the kidney. Recent advances in early diagnosis and management of renal disease have miraculously reduced the number of nephrectomies performed for renal diseases in general and for benign renal diseases in particular (9-11). In the modern era, minimally invasive surgery has become the standard treatment for most of the urological pathologies (12). The laparoscopic approach to nephrectomy gained widespread acceptance both in the urologic and surgical procedures (13). In fact, laparoscopic partial nephrectomy represents the standard of care for small low stage renal cell carcinoma (14).

In this study, 115 adult nephrectomies were performed in the institute over a 10 year-interval. Even though the nonfunctioning kidney is the foremost indication of nephrectomy in 46 (40%) patients in this series, it has been noticed, especially in the last five years to be an increase in the incidence of renal tumors that are diagnosed. Out of 54 solid renal masses, 43 (37%) with renal cell carcinoma (RCC) have undergone nephrectomy. This is in contrast to what has been reported by El Fadil et al. (15) twenty years ago from the same institute. They reported only 11 (13%) RCC cases in their series which is almost a quarter the incidence of this study's findings [Table 2]. This significant increase in RCC diagnosis in the current study is basically attributed to the routine use of ultrasound in recent years. This has increased the incidental discovery of low stage renal cell carcinoma with a favorable overall prognosis. This routine use of imaging was not feasible twenty years ago. This presumption was supported by multiple studies that noticed an increase in the incidental renal tumor's diagnosis (16,17).

Another significant observation in our results was the emerging and evolving established minimally invasive procedure services in our institute over the last five years. A total of 14 (12%) and 3 (2.6%) patients underwent laparoscopic and robotic-assisted nephrectomy, respectively. Partial nephrectomy was done in 10 (9%) patients in the series. Twenty years ago, during Elfadil et al.'s study, all these minimal invasive nephrectomy procedures were not feasible. Regarding the complications, there were no major life-threatening complications reported in the study. All complications were managed conservatively.

The benign renal tumors like oncocytoma, angiomyolipoma and cortical adenoma in the current series were in 7 (6%) patients. This is essentially similar to the incidence being reported from regional and worldwide series (18,19). The incidence of benign tumor in El Fadil et al. (15) series, however, was not reported.

In reviewing the overall indications of nephrectomy, studies show variations regarding the indications for nephrectomy. A study from Akmal, Mirza and Murtaza (20) and Eke and Echem (21) found radical nephrectomy for malignant renal tumors constituted an approximate ratio

of 53.3% and 67%, respectively. Zehhof et al. (22) provided data according to which overall 1,093 nephrectomies were undertaken, from which few were related to the cases of benign conditions while the majority of them were dedicated to non-functioning kidneys. In another review of 47 nephrectomies from Karachi, (23) 52% were for stone-related etiology and 26% were for tumors. These studies are thus supporting an observed regional variation in the indications for nephrectomies. The socioeconomic condition and availability of health care facilities are probably the main factors behind this variation.

This observed paradigm shift is affirmed and supported by other studies from other worldwide centers. It is not only geographical interval variations but a time interval variation, too. In a large US-population renal tumors data review, SEER cancer review found that the incidence of RCC has increased in recent decades almost 3% annually from 1975 to 2007 (24). This RCC incidence increase is multifactorial. It is potentially in large due to increased use of imaging modalities. Another study from Riyadh Saudi Arabia by Alkhateeb et al. (5) found an increasing incidence of kidney cancer patients over the last two decades. Another study by Gupta et al. (25) in a comparative study found an increase of incidental renal tumor from (10.67%) to (27.63%) over a 20 years interval ($P = 0.001$). So, renal tumors with lower stage and grade have led to a surge in laparoscopic and open nephron sparing surgeries. Our center proudly has started these minimal invasive approaches and is perusing training to the junior urologists to adopt these evolving techniques.

This study has certain limitations. It is a retrospective review with possible selection and methodology bias. The second limitation of our study is that the overall survival was not addressed in this study. This is because of the heterogeneity of our sample. The study sample was not only for pure malignant cases to measure overall and cancer-free survival. It is rather mixed benign and malignant renal disorders making the survival estimates unlogic.

Conclusion

Though nonfunctioning kidney is the leading indication of nephrectomy in our series, renal tumors are a leaping indication of nephrectomy in recent years. This significant paradigm shift urges immediate and long-term health planning for this uprising issue. Increasing the awareness of healthcare givers through conferences and workshops is compelling. Furthermore, an increase in laparoscopic training is recommended for the young urologists to promote their expertise with nephron-sparing surgeries as they are the evolving standard of care for patients with such conditions.

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