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ORIGINAL ARTICLE

INDICATIONS AND OUTCOMES OF NEPHRECTOMY IN AYDER COMPREHENSIVE SPECIALIZED AND MEKELLE HOSPITALS, NORTHERN ETHIOPIA: A 5 YEAR EXPERIENCE

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ABSTRACT

Background: *Nephrectomy and subsequent surgical interventions for renal diseases provided clinical information and histopathological insight that form the basis of current concepts regarding renal diseases.*
Objective: *To describe the indications and outcomes of nephrectomy in upper urinary tract lesions including tumors*
Patients and Methods: *This is a retrospective study of all patients who underwent nephrectomy in Ayder comprehensive specialized (ACSH) and Mekelle hospitals during a five-year study period (January 1, 2013 to December 31, 2017). Relevant information was retrieved from case notes and analyzed.*
Results: *There were 106 patients who underwent nephrectomy in Ayder and Mekelle hospitals. Their ages ranged from 1- 85 years with slight male preponderance. Most 78 (73.6%) were carried out for benign conditions. The majority 53 (50%) were operated for non-excreting kidneys due to stone diseases, followed by PUJ obstruction 15 (14.2%), benign renal masses 3 (2.8%) and renovascular hypertension 3 (2.8%). Twenty-eight (26.4%) patients had nephrectomy for malignant renal diseases, mainly adenocarcinoma and Wilm's tumor accounting for 20 (18.9%) and 6 (5.7%), respectively. The overall complication rate was 39.6% (42/106). Complication was higher in those patients operated for renal neoplasms, the commonest being postoperative bleeding that required transfusion 16 (15.1%). There was one death (0.9%).*
Conclusion: *In this study, the rate of nephrectomy for non-excreting kidneys due to stone disease appeared to be high, mostly affecting the younger age groups. Hence, early intervention with effective preventive and organ sparing therapy measures can reduce most of the preventable benign conditions for nephrectomy.*
Key words: *Nephrectomy, indication, outcomes, Mekelle*

INTRODUCTION

Nephrectomy and other subsequent surgical interventions for renal diseases provided the clinical information and histopathological insight that form the basis of current concepts regarding renal tumors (1). The first planned nephrectomy was carried out by Simmon in 1869 for persistent ureteral fistula (2). Subsequently, other authors reported a larger volume of surgical extirpation of the kidney, a sufficient number to permit analysis of clinical, surgical and pathologic features of renal disorders that required surgery (3). Simple nephrectomy entails removal of the kidney with gerota fascia and is employed to manage nonmalignant diseases of the kidney. The Indications for simple nephrectomy include non-function or poor function of a kidney due to obstruction, infection, trauma, stone diseases, nephrosclerosis, vesicoureteral reflux and congenital dysplasia (4).

Another indication for nephrectomy is also when reconstructive procedures have failed or are contraindicated due to poor function of the renal unit, advanced age or co-morbidity. Simple nephrectomy for a functional kidney may also be employed to relieve intractable symptoms or associated problems, such as profuse bleeding, pain or persistent infection. Simple nephrectomy is an acceptable treatment modality for renovascular hypertension that is refractory to other organ sparing therapies (5).

The treatment of kidney diseases has been completely revolutionized with the advances in diagnostic and interventional radiology (6, 7). Nowadays, there are fewer nephrectomies performed for hydronephrosis, stone disease, infection and trauma or renovascular diseases. Even for malignant diseases, some surgeons prefer nephron sparing surgeries than nephrectomy (8).

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Nonetheless, many indications still exist to carry out nephrectomy. Although radical nephrectomy is standard treatment with localized renal carcinoma with a normal contralateral kidney, there is growing interest in the use of nephron sparing surgery for selected patients (9, 10).

Until recently, the number of nephrectomies done has not significantly changed worldwide, whereas nephrectomies for benign upper urinary tract lesions are significantly reduced because of early presentation, diagnosis and modern intervention. Although this decrease of nephrectomy for benign renal conditions was observed worldwide, it remains significant in the developing world. This is mainly due to poorly equipped health facilities with inadequately trained health personnel and lack of awareness of disease related morbidities resulting in late presentation (8, 11). The current study aimed to describe our experience and to highlight the spectrum of kidney diseases indicated for nephrectomy including morbidity in the study area.

PATIENTS AND METHODS

This is a retrospective descriptive study conducted on all patients who underwent nephrectomy for upper urinary tract diseases with significant loss of renal units due to various causes and neoplasms in all admitted patients to Ayder comprehensive specialized and Mekelle hospitals from January 1, 2013 to December 31, 2017. Ayder comprehensive specialized and Mekelle hospitals are located in Mekelle, Tigray regional state in Northern Ethiopia at a distance of 788 km from Addis Ababa. All patients of different age groups and both genders were included in the study. Adequate medical records have been maintained in the hospital on all patients undergoing nephrectomy. The study group consisted of 106 individuals who had undergone nephrectomies during the study period. The clinical reports of all patients were retrieved after reviewing the case notes from the registers, medical records office and operating registration book. Information obtained included sociodemographic variables, clinical presentation, investigative modalities, diagnosis, and type of surgery and treatment outcomes.

Diagnosis was based on clinical assessment, laboratory tests, different imaging modalities as per the indications as well as by operative findings and tissue biopsies. Disease characterization and operative outcomes were also recorded. Our study had been approved by the research and community service council ethical review board of the institution.

Data was obtained using a pretested structural questionnaire. Descriptive analysis was carried out using SPSS version-20 and Epi info 3.5.1 and results were displayed using numbers percentages, tables and graphs.

RESULTS

During the study period, a total of 106 patients who underwent nephrectomy for upper urinary tract benign lesions and renal tumors were analyzed. The age ranged from 1- 85 years with mean ± SD and median ages of 38.06 ± 19.28 and 39.50 years, respectively. Males 57 (53.8%) were slightly more affected than females 49 (46.2%), giving a male to female ratio of (M: F; 1.2:1). Most 21 (20.8%) nephrectomies were carried out in age groups between 41-50 years of life Overall, majority 78 (73.6%) of the nephrectomies were employed in patients under the age of 50 years. (Table 1).

Table-1: Socio-demographic distribution of patients who underwent nephrectomy, Ayder Comprehensive Specialized Hospital and Mekelle Hospital, Ethiopia (January 2013 to December 2017).

Age group (years)	Sex		Total	Percentage
	Male	Female		
1-10	9	1	10	9.4%
11-20	7	5	12	11.3%
21-30	5	12	17	16.0%
31-40	9	8	17	16.0%
41-50	9	13	22	20.8%
51-60	10	7	17	16.0%
>60	8	3	11	10.3%
Total	**57**	**49**	**106**	**100%**

In this series, the principal clinical presentation of upper urinary tract lesions indicated for nephrectomy included flank pain 67 (63.2%), abdominal swelling 23 (21.7%) and hematuria in 9 (8.5%) of the cases. Meanwhile, the duration at presentation ranged from 0.25 month to 252 months with a mean duration of 114.25 months.

In this study, 78 (73.6%) of patients had simple nephrectomy for benign upper urinary tract lesions, whereas 28 (26.4%) of the patients had undergone radical nephrectomy for renal malignancies (Table 2) with male predilection.

Among the malignant lesions indicated for nephrectomy, most 15 (14.1%) had stage 3 tumor, while 7 (6.6%) patients had stage 2 disease and the remaining cases were stage 1 and stage 4 tumors.

Only one patient had partial nephrectomy. No significant variation was observed between right 54 (50.9%) versus left 52 (49.1%) nephrectomy in both benign and malignant disease categories in this series. Open surgical approach was employed in 103 (97.2%) of the cases while 3 (2.8%) patients had laparoscopic nephrectomy in cases with low tumor stage and low tumor volume contained within the kidney and the renal fascia. Overall, benign upper urinary tract diseases indicated for nephrectomy mostly occurred in ages younger than 50 years, whereas the majority of the malignant renal lesions were observed in ages above 50 years of life.

Table 2. Indications of nephrectomy, Ayder Comprehensive Specialized Hospital and Mekelle Hospital, Ethiopia (January 2013 to December 2017).

Indications	Frequency	Percentage
Non-excreting kidney due to stone	53	50.0%
Renal malignancy	28	26.4%
Pelvic Ureteric Juncton obstruction	15	14.2%
Benign renal mass	3	2.8%
Renovascular hypertension	3	2.8%
Polycystic diseases of the kidney (symptomatic)	2	1.8%
Persistent renal infection	1	0.9%
Trauma/iatrogenic injury	1	0.9%
Total	**106**	**100%**

At surgery, benign upper tract urinary tract diseases were the most common indications for nephrectomy 78 (73.4%), of which 53 (50%) of the total cases were non-excreting kidneys with significant renal tissue loss due to urinary stone diseases. Pelvic Ureteric Junction (PUJ) obstruction 15 (14.2%), benign renal masses 3 (2.8%) and renovascular hypertension 3 (2.8%) which was observed in younger patients with hypertension not responding to medical therapy, subsequently underwent angiography revealing renal artery stenosis with shrunken kidneys were the other observed benign lesions indicated for nephrectomy while, twenty-eight (26.4%) cases had renal malignancies (Table 2).

Among the malignant renal lesions, the predominant histology was adenocarcinoma 20 (18.8%) followed by Wilms' tumor 6 (5.6%), (Table 3).

Table 3. Histopathologic characterization of renal neoplasms, Ayder Comprehensive Specialized Hospital and Mekelle Hospital, Ethiopia (January 2013 to December 2017).

Histopathologic characterization	**Frequency**	**Percentage**
Adenocarcinoma (N=20)		
Clear cell subtype	16	50.00%
Papillary cell subtype	2	6.25%
Chromophobe subtype	2	6.25%
Wilms' Tumor	6	18.75%
Renal Pelvis / urothelial Carcinoma	2	6.25%
Oncocytoma	1	3.13%
Dysplastic cystic disease	2	6.25%
Xanthoglomerulonephritis	1	3.13%
Total	**32**	**100%**

Regarding morbidity and mortality, the overall complication rate was seen in 42 (39.6%) which was higher in those patients operated for renal malignancies. Postoperative bleeding that required blood transfusion was seen in 16 (15.1%) patients. Fourteen cases were operated for renal malignancies while two patients were operated for non-excreting kidney with extensive adhesions due to stone disease.

Wound infection 14 (13.2%) and pneumonia 11 (10.3%) were the other observed morbidities.

There was one death related to nephrectomy in a patient operated for non-excreting kidney with persistent renal infection and stone disease who developed renal failure due to sepsis in this series (0.9%), (Figure 1).

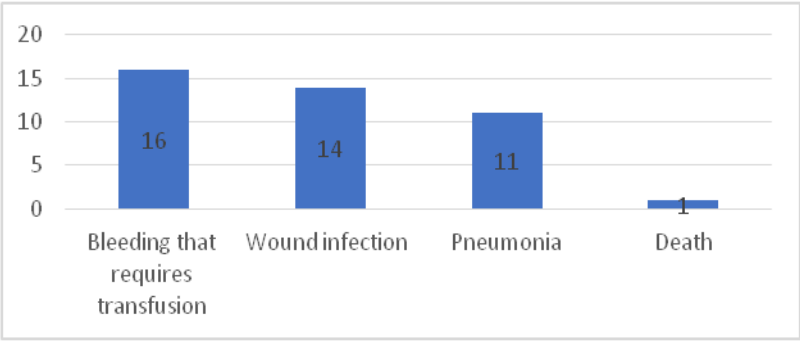

Fig 1. Principal postoperative morbidities, Ayder Comprehensive Specialized Hospital and Mekelle Hospital, Ethiopia (January 2013 to December 2017).

DISCUSSION

The field of urology has undergone unprecedented advances during the past decades. Advances in Extracorporeal Shock Wave Lithotripsy (ESWL), laparoscopic and minimally invasive endoscopic surgery and reconstructive urology are some of the highlights (8, 12, 13). Recent advances in early diagnosis and management of upper urinary tract disease have miraculously reduced the number of nephrectomies performed for renal disease in general and for benign renal lesions in particular (8, 13). With advances in antibiotic preparations that have broad spectrum antimicrobial activity, the incidence of infection related morbidity and mortality has significantly dropped (13).

Early diagnosis and minimally invasive management of nephrolithiasis has reduced the incidence of nephrectomy. Although these changes are noticed worldwide, they are more pronounced in developed countries and far less in developing and underdeveloped countries (13). In this series, 73.6% of nephrectomies were carried out for benign upper urinary tract lesions which is comparable to similar earlier studies in Ethiopia, Pakistan and Jordan with rates of 63%, 76% and 70% in their series respectively (4,5,14).

In the present study, 50% of the nephrectomies were performed for non-excreting kidney due to stone disease which is comparable to a report by Rafique M (52.3%) (4). This huge incidence of nephrectomy for non-excreting kidneys due to stone disease is directly related to delayed presentation of the patients, when the kidney is not only full of stones but also has associated severe infection, which was the scenario in this study. PUJ obstruction (14.6%) was the other most common benign urologic condition where nephrectomy was carried out in the study subjects which is consistent with a similar study by Rafique M, Muhammad A, et al and Ibrahim D who reported 16%, 17.3% and in 15% of their cases respectively (4, 8, 15). Among the urologic diseases, renovascular hypertension (2.8%) was the other reason for nephrectomy in this series. A similar trend has been observed in earlier study by Muhammad A, et al with a rate of 4.7% (8).

The number of nephrectomies for renal neoplastic lesions has increased which is consistent with the accepted policy that surgery is the mainstay therapeutic option for renal cancers (2). In our study, 26.4% of the nephrectomies were performed for malignant renal tumors. Adenocarcinoma (71.4%) followed by Wilms' tumor (21.4%) were the commonest histological types.

A similar finding was reported by Beisland C, et al which demonstrated nephrectomies for renal cancers in 64.3% of their study and adenocarcinoma was the frequent histologic lesion (13). A similar study in Nigeria revealed that Wilms' tumor was the second most common malignant etiology indicated for nephrectomy which is comparable to our study (16).

The overall morbidity in this series was 39.6%, a higher rate compared to studies in Norway, Pakistan, Jordan and Spain, which reported rates of 15.5%, 21.4%, 11.6% and 8%, in their cases respectively (4, 5, 13, 17). In this series, one (0.9%) death was encountered due to renal failure following septicemia. In other studies, mortality rate ranging from 0.8% to 3.1% was reported (13, 17). These data highlight that nephrectomy should be regarded as a major surgical procedure with a consistent risk of complications mainly for renal malignancies.

In conclusion, the study has depicted that most nephrectomies were carried out for benign conditions predominantly in non-excreting kidneys due to stone disease. Therefore, the authors suggest that much effort is needed to avert the high rate of nephrectomies for stone diseases by increasing public awareness about the disease related morbidities through education. This will significantly decrease the rate of nephrectomy for preventable benign conditions like severe and persistent renal infections and stone diseases.

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