



## MAIN CAUSES OF NEPHRECTOMY IN SAMPLES ANALYZED IN A HOSPITAL PATHOLOGY'LAB FROM 2000 TO 2015

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### ABSTRACT

**Introduction:** Sometimes, renal chronic diseases need surgical intervention. The choice of the form of surgical intervention will depend on the individual analysis of each case. **Objective:** This study aims to present the prevalence of renal chronic diseases, which require invasive intervention. **Methods:** With a cross sectional study, quantitative, observational, descriptive and analytical nature, was carried search obtained through anatomopathologic reports and patient's records, from January 2000 to December 2015 available in a Pathology Lab. **Results:** A total of 533 patients who underwent some surgical procedure involving the kidney were included, the more prevalent demographic profile was male with 55.8% of the cases, with the age group 45 to 74 years representing 65.3%. The main diagnosis found was that of neoplasia. **Conclusions:** Knowledge of the kidney diseases that may require nephrectomy is relevant in order to obtain greater predictability, for an earlier diagnosis and a less invasive approach whenever possible.

**Keywords:** Nephrectomy. Renal cell carcinoma. Pyelonephritis.

### INTRODUCTION

In 1869, Gustav Simon performed the first invasive renal treatment for kidney disease without clinical solution. Only in 1932 the first scheduled partial nephrectomy occurred, which impacted improvement in the postoperative process of patients and postoperative renal function (WEIN, A.J.; 2016).

The choice of the form of surgical intervention will depend on the individual analysis of each case, with variables such as patient response, stage of renal pathology and surgical environment.



Renal surgical intervention has been undergoing a process of change with nephrectomy by minimally invasive technique (laparoscopy and robotics) increasingly present (CACERES, F.; 2011). It has advantages such as less pain and a shorter recovery period, generating shorter hospital admissions and reduced complication rates (WILSON, C.H; 2005).

The definition of performing partial, total or radical nephrectomy will depend on the present pathology and renal function of the patient. Total nephrectomy is performed with ligation of blood vessels and complete resection of the kidney, and in some cases of the ipsilateral adrenal gland, and is also used to treat benign diseases that have evolved to the need for surgical intervention. The gold standard for intervention in neoplasms is radical nephrectomy, which differs from total nephrectomy because it includes perirrenal fat, renal hilum and lymph nodes in resection, maintaining the integrity of the renal fascia, but in selected patients, such as single kidney adenocarcinoma or insufficiency of contralateral renal function, partial nephrectomy may be the choice (NORBERTO, O.B.; 2002). Regardless of the technique, every effort should be made to remove the sample from the intact lesion (COHEN, D.D.; 2005).

Cases indicated for partial nephrectomy are those with tumors smaller than 7 centimeters and risk of loss of renal function or situations that the procedure would make the patient anephric (BRASIO, R.M.D.; 2009), also depending on the evaluation of tumor topography and the presence of exophytic lesion.

This study aims to present the prevalence of chronic diseases, which require invasive intervention. In order to provide data base for treatment measures and knowledge for predictability of kidney pathologies.

## **METHODS**

A cross-sectional, quantitative, observational, descriptive and analytical study was conducted with the inclusion of information from medical records and anatomopathological reports to identify the prevalence of kidney pathologies that were submitted to invasive surgical treatments from January 2000 to December 2015, using data from the pathology service of hospital São Vicente de Paulo in Passo Fundo- RS Brazil.



Data collection was initiated after the approval of the research project by the Research and Teaching Management of Hospital São Vicente de Paulo and the Ethics and Research Committee of the Federal University of the Fronteira Sul, with favorable number 4477186. The following data were considered: age group (grouped according to division of the World Health Organization), gender (male and female), date (year of the procedure), type of material in sample, procedure performed and anatomopathological diagnosis. The data collection process occurred with a double typing through the program EpiData 3.1, in the pathology laboratory hospital on a computer intended by the institution, through a login in a room reserved to preserve the privacy of the participants.

For data collection, a transcription form was used to organize and guide the collected variables. At the end of the collection process, statistical analysis was initiated through the PSPP software, composed of mean, standard deviation, frequency distribution and crossing of diagnostic data of neoplasms and nonspecific chronic pyelonephritis with sex and age.

## **RESULTS**

Based on the pathological reports of the pathology service of the Hospital São Vicente de Paulo, 533 patients who underwent some form of invasive kidney procedure in the 16 years analyzed were identified. The demographic situation (Table 1) of the most prevalent age was between the age groups from 45 to 59 years and 60 to 75 years, with a difference of 0.2% among them, with the mean age being 52.8 years ( $\pm 18.1$ ), with predominance of males, 55.8% of the total. Regarding the annual flow of invasive surgical procedures, in 2008 we found 70 interventions, with an average of 33.3 annual nephrectomies.

The most common intervention performed in the period was radical nephrectomy, which occurred in 41.4% of the procedures, followed by total nephrectomy with 40.0%, in both procedures, kidney is completely removed, but the greatest indication of radical operation is due to the joint removal of perirenal fat and renal hilum, being a better choice for resection of malignant tumors (RICHIE, J.P.; 2020). The laterality distribution of the operated kidney was approximated, with a higher prevalence in the left kidney with 42.6%, however 13.9% of the reports did not indicate the nephrectomy side (Table 1).



**Table 1.** Demographic and operative situation of patients submitted to surgical procedures from 2000 to 2015, in Passo Fundo- RS. (n=533)

Variables	n	%
Age in full years (n=520)		
0 to 11 years old	15	2,9
12 to 18 years old	14	2,7
19 to 44 years old	109	20,9
45 to 59 years old	170	32,7
60 to 74 years old	169	32,5
75 years old or more	43	8,3
Sex (n=530)		
Male	294	55,8
Female	233	44,2
Procedure (n=533)		
Radical Nephrectomy	221	41,4
Total Nephrectomy	213	40,0
Partial Nephrectomy	99	18,6
Material analyzed (n=533)		
Left kidney	227	42,6
Right kidney	215	40,3
Kidney no side ID	74	13,9
Transplanted kidney	17	3,2

Pathological examinations are performed by careful evaluation of the surgical specimen to determine different diagnoses, and it is therefore possible to observe a larger number of diagnoses in relation to the number of analyzed cases. The study included 533 pathological examinations performed in the period 2000-2015, of which they revealed 799 different diagnoses (Table 2). The group of neoplasms represented 35% of the total nephrectomies, among these, 84.6% were of the histological subtype clear cell carcinoma. Neoplasms that were in an advanced state with the presence of some degree of metastases represented 35% (n=98), and the most common site of metastases was bone.



When evaluating non-neoplastic diseases, nonspecific chronic pyelonephritis was present in 25.6% of the reports, either alone or in association with other kidney lesions. The diagnosis of hydronephrosis in 15.6% and renal atrophy in 14.5%. Nephrolithiasis, an important cause of renal disease, was found in 6.9% of non-neoplastic diagnoses.

**Table 2.** Pathological diagnoses of patients undergoing nephrectomy between 2000 and 2015 in Passo Fundo - RS. (n=799)

Diagnosis	n	%
Neoplasms (n=280)		
Clear renal cell carcinoma	237	84,6
Papillary renal cell carcinoma	15	5,4
Chromophobe renal cell carcinoma	6	2,1
Other tumours	22	7,9
Non-neoplastic diseases (n=519)		
Nonspecific chronic pyelonephritis	133	25,6
Hydronephrosis	81	15,6
Renal atrophy	75	14,5
Cystic lesion	57	11,0
Nephrolithiasis	36	6,9
Trauma	29	5,6
Vascular changes	23	4,4
Adjacent pathology	22	4,2
Pyonephrose	16	3,1
Transplant rejection	13	2,5
Other diagnoses	34	6,6

For data related to neoplasia diagnosis, without specifying the subtype, male gender and increasing evolution of age group had a significant relevance ( $p < 0.001$ ) in relation to the outcome (Table 3).



**Table 3:** Sociodemographic characterization of malignant kidney neoplasms of patients undergoing nephrectomy between 2000 and 2015 in Passo Fundo - RS. (n=533).

Variables	Renal neoplasia		Other diagnoses		p
	n	%	n	%	
Sex (n=527)					<0,001
Male	185	62,9	109	37,1	
Female	91	39,1	142	60,9	
Age (n=520)					<0,001
0 to 11 years old	1	6,7	14	93,3	
12 to 18 years old	1	7,1	13	92,9	
19 to 44 years old	30	27,5	79	72,5	
45 to 59 years old	91	53,5	79	46,5	
60 to 74 years old	115	68,0	54	32,0	
75 years old or more	33	76,7	10	23,3	

The diagnosis of nonspecific chronic pyelonephritis had an inverse design to the group of neoplasms, with higher prevalence in females and in the age group from 0 to 11 years, decreasing with age increase (Table 4).

**Table 4:** Sociodemographic characterization of the prevalence of nonspecific chronic pyelonephritis of patients undergoing nephrectomy between 2000 and 2015 in Passo Fundo - RS. (n=533).

Variables	Nonspecific chronic pyelonephritis		Other diagnoses		p
	n	%	n	%	
Sex (n=527)					<0,001
Male	41	13,9	253	86,1	
Female	88	37,8	145	62,2	
Age (n=520)					<0,001
0 to 11 years old	9	60,0	6	40,0	
12 to 18 years old	6	42,9	8	57,1	
19 to 44 years old	42	38,5	67	61,5	



45 to 59 years old	39	22,9	131	77,1
60 to 74 years old	27	16,0	142	84,0
75 years old or more	5	11,6	38	88,4

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## DISCUSSION

Renal surgical intervention is indicated for cases of neoplasms, for diseases with failure of the renal function or in cases of organ transplants. The average of annual nephrectomy achievements found, 33.3 procedures, was close to that described by Ribeiro et al. in 2018, in a hospital of Rio de Janeiro, with 34.8 surgeries performed annually (RIBEIRO, D.C.; 2018). The retrospective results of this study showed that total and radical nephrectomies were the principal surgical approach, while the choice for partial nephrectomy has had a higher incidence in recent years, as described by Lau et al (LEU, W.K.O.; 2000). Several recent studies have found no significant difference between radical or partial procedures in survival, metastatization and recurrence of neoplasms. In addition to the partial nephrectomy presenting a better quality of life for patients in the postoperative period (BECKER, F.; 2009).

The sociodemographic profile of patients undergoing nephrectomy was of men with a mean age of 52.8 years ( $\pm$  18.1). Kim and Cho (CHO, C.; KIM, K.; 2007), 2007, performed the analysis of the main causes of nephrectomies from 1980 to 2005 in South Korea, the study was divided into 3 periods, and demonstrated an increasing average age of patients undergoing the procedure, from 39.0 ( $\pm$  14.7) years old in the 1980s to 53.4 ( $\pm$  17.5) in the years 2000, close to the average found in the present study.

From the 799 different diagnoses found, the group of neoplasms represented 35%, being the most common histological subtype, clear renal cell carcinoma, followed by papillary renal cell carcinoma, with a prevalence within the range described by Atkins and Choueiri, 2021 (ATKINS, M.B.; 2021). Males had a higher prevalence of neoplasms, associated with age as an important risk factor, diagnosis is uncommon at ages younger than 40 years and rare in pediatric age groups (SIEMER, S.; 2006). The most common metastatic dissemination route is hematogenous, so that cell invasion of the renal vein or vena cava is a striking feature of renal cell carcinomas (WAHNER-ROEDLER, D. L.; SEBO, T.J.; 1997).



ADANUR, S. et al 2014, evaluated 696 nephrectomies, 40.2% were neoplastic causes and 59.8% by non-functioning kidneys not related to neoplasms, among these, the main cause was the presence of stones in the upper urinary tract, followed by hydronephrosis and atrophic kidney. Data differ from those found in this study, where urinary lithiasis was only the fifth cause of nonneoplastic nephrectomy. Nephrectomy due to renal calculus is unusual, surgical intervention is considered in situations such as poor renal function, severe infections, abscesses, fistulas or progression to malignancy (PEARLE, M.S.; 2014).

Nonspecific chronic pyelonephritis was among the main causes of nephrectomies not related to neoplasms, its prevalent appearance can be explained with the fact that it is a diagnosis associated with other etiologies, not necessarily an isolated cause for renal procedure. Nonspecific chronic pyelonephritis is a pathology with tubulointerstitial inflammation, and is sometimes used as a synonym for interstitial nephritis and atrophic pyelonephritis (HUANG, J. J.; TSENG, C. C.; 2000). The progression of the disease to chronic renal failure occurs in approximately 15% of cases and its main etiological cause is infectious (ROTARU, L.; 2018). The infectious etiological factor collaborates with the explanation of the results obtained in the present study, since women and smaller age groups are more affected by infectious pathologies in the urinary tract (FOXMAN, B.; 2014).

Although the sample size was adequate, it is possible to identify some limitations of the study, because it was based on secondary data, besides, the impossibility of monitoring patients, given the long period analyzed, interferes in an important postoperative follow-up to establish the effectiveness of the treatment.

## **CONCLUSION**

The proposal of the present study was consummated, bringing an overview of the main renal pathologies that required invasive surgical treatment, in a period of 16 years, in a hospital the Passo Fundo city, northern region of Rio Grande do Sul, Brazil. In this context, the histological subtype clear renal cell carcinoma represented the principal cause of nephrectomy. Males had a 1.6 times higher risk of developing neoplasms and females had 2.7 times higher risk of nonspecific chronic pyelonephritis.





In the literature, studies on the prevalence of renal diseases requiring invasive surgical treatment are not frequent. The knowledge concerning of diseases that affect the kidney and may require nephrectomy is necessary in order to obtain greater predictability of the evolution of these conditions, with the goal of an earlier diagnosis and a less invasive approach, whenever possible.

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