ORIGINAL RESEARCH PAPER

Volume-9 | Issue-5 | May-2020 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

IMPACT OF NEPHROSTOMY IN PATIENTS UNDERGOING NEPHRECTOMY FOR CALCULUS DISEASE

Urology

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ABSTRACT

Introduction: Simple nephrectomy is the procedure of choice in the treatment of non functioning kidneys secondary to any cause. Relief of urinary tract obstruction represents most common indication of PCN placement in 85-90% patients. We aimed to compare surgical results in open simple retroperitoneal nephrectomies in patients with and without nephrostomy.

Methodology: 138 patients over a period of 6 years were analysed retrospectively. The demographic parameters, Intra operative variables (surgical time, Intraoperative bleeding) and postoperative complications (need for intensive care, need for transfusion, surgical wound infection and hospital stay days) were compared in patients with and without Nephrostomy using chi square test.

Results: 60 patients underwent open simple nephrectomy secondary to calculus disease. Mean age of patients undergoing open simple nephrectomy secondary to calculus disease was 42 years. Statistically significant differences were found for the variables of surgical time, hospital stay days, need for ICU and transfusion requirements more in favour of patients with nephrostomy tube. There were no differences in the need for intra operative bleeding, intraoperative complications and surgical wound infection.

Conclusion: Simple nephrectomy secondary to calculus with a nephrostomy is never simple but more complicated due to longer surgery time, longer duration of hospital stay, higher need for blood tansfusion and ICU care. More meticulous technique and adequate preoperative optimisation of the patient is must before open nephrectomy secondary to calculus.

KEYWORDS

Open Nephrectomy, Nephrostomy, Calculus Disease

INTRODUCTION

The first planned nephrectomy with a good outcome was performed by german surgeon Gustavo Simon in Heidelberg, Germany, in 1869.[1-3] In initial days nephrectomy entailed high morbidity and mortality, rates as high as 50% were reported due to nonavailability of sterile conditions.[4,5]At the end of the 19th century, as asepsis technique and latex gloves were discovered, the number of complications and mortality reduced considerably.[6—8] The prevalence rate of stone disease is 5-12% in men, 4-7% in women. Stone disease is one of the common causes of obstructive uropathy with reported life-threatening complication rate of 12%. Among all causes of Non-functioning kidney, calculus disease is found in about 48-52% of patient.[9] 70.3% of patients presenting with pyonephrosis have calculus as a cause. Percutaneous Nephrostomy was first described in 1955 by Goodwin et al as a treatment for urinary tract obstruction. In 85-90% patients the most common indication of PCN placement is to relieve urinary tract obstruction. Also, 26% of all nephrostomy tubes were placed because of calculus disease.[10] In the era of minimal access surgery open simple nephrectomy is performed in selected cases. Pyonephrosis secondary to calculus is life-threatening and can progress rapidly, resulting in sepsis and multiple organ failure, requiring broad antibiotic coverage and immediate drainage.[11,12] Chronic obstruction leads to a gradual loss of renal function until the kidney becomes non-functional, secondary to obstruction of urine and recurrent infections.[9]The current treatment of choice to treat a nonfunctioning kidney is a simple nephrectomy using the retroperitoneal approach because of a lower incidence of complications and mortality.[12,13]In our institution open simple nephrectomy using the retroperitoneal approach plays an important role in the treatment of patients with a diagnosis of a non-functioning kidney, of whom many have a history of placement of a nephrostomy catheter percutaneously to treat their obstruction and pyonephrosis as initial management. Hence we aimed to compare surgical results in open simple retroperitoneal nephrectomies in patients with and without nephrostomy secondary to calculus disease and to describe the outcomes of open simple nephrectomies using a retroperitoneal approach secondary to calculus disease.

METHODOLOGY

We performed the study in a retrospective manner in our hospital for a period of 3 years from January 2014 to January 2017. The data contained in the clinical records were reviewed and gathered.our objective was to compare surgical results in open simple retroperitoneal nephrectomies in patients with and without nephrostomy secondary to calculus disease. We assessed a total of 168 records of patients who had undergone open simple nephrectomies. We included 60 patients with a diagnosis of non-functioning kidney confirmed by renal scintigraphy, who had undergone a simple nephrectomy secondary to calculus disease in our institution performed by a group of urologists. The retroperitoneal approach by flank incision was used in all the patients, and they all received antibiotic cover at the time of surgery. A descriptive, cross-sectional and comparative study was performed. Patients were divided into two groups, Group A with those with a nephrostomy before nephrectomy and Group B with those without a nephrostomy catheter. We performed nephrectomy for those with nephrostomy after 6 weeks post nephrostomy insertion. The demographic parameters compared were age, gender, and site of stone, Intraoperative variables (surgery time and intraoperative bleeding) and postoperative variables (need for ICU, need for blood transfusion, surgical wound infection and hospital stay). Both group variables were compared using a Chi-square test with Yates correction for the non-parametric data.

RESULTS

A total of 60 patients with a history of open simple nephrectomy were included. There were 28 males (46.6%) and 32 females (53.4%). The mean age was 39.8 years. The location of the stones was pelvic in 33.3%, ureteral in 58.4%and calyceal in 8.3%. Regarding the intraoperative variables, the mean intraoperative bleeding was 319.4 ml (range: 20---2000 ml) and the mean surgery time, from the skin incision to wound closure, was 150.6 min (range: 62---318). The postoperative variables were as follows: 18patients required a transfusion (30%) (Clavien-Dindo II), 6 patients had a vascular injury or injury to a solid organ during the operation (10%) (Clavien-Dindo IIIb), 10 patients were admitted to the intensive care unit (16.7%) (Clavien-Dindo IV), the mean hospital stay was 6 days (range: 2---10), 15 had a surgical wound infection (25%) (Clavien-Dindo II) and none of them died (Table 1). The patients were divided into 2 groups, Group A with a nephrostomy catheter and Group B without a nephrostomy

catheter. Out of all cases reported, 24 patients had a nephrostomy catheter (40%) and 36 did not (60%); we had no mortality in any of the groups. On comparing the two groups, there was a mean Intraoperative bleeding in group A of 380 ml (range: 100-1200ml), and in group B of 279 ml (range: 20-600ml). Surgery time in group A was a mean of 175 min (range: 75---300) and in group B 130 ml min (range: 55---230). The mean hospital stay in group A was 7.5 days (range: 5-15) and for group B it was 5.2 days (range: 4---10). Sixteen patients in group B required a blood transfusion (66.7%) and 2 patients in group 2 (5.5%). Nine patients in group A required admission in the intensive care unit (37.5%) and 1 patient in group B (2.8%). Five patients in group A had a vascular injury or injury to an organ (20.83%) as did 2 patients in group B (5.5%). Eight patients had a surgical wound infection in group A (33.3%) and 7 patients (19.4%) in group B(Tables 2 and 3). On comparing the 2 groups statistically significant differences were found for the variables surgery time (p = 0.009), length of hospital stay (p = 0.0040) need for blood transfusion (p = 0.0180) and the need for intensive care (p = 0.0421). There were no differences in Intraoperative bleeding (p = 0.424), intraoperative complications(p = 0.111) and surgical wound infection (p = 0.56).

Table 1 Descriptive statistics of patients in our study

Variable	Totalnumber	Mean	percentage
Gender Male Female	 28 32	 N/A N/A	 46.7 53.3
Age Male Female		39.8years 42.4years 38.6years	
Locationofstone Pelvic Ureteral Calyceal	 20 35 5	 N/A	 33.3 58.4 8.3
Totalbleeding	60	319.4ml	N/A
Surgerytime	60	150min	N/A
Transfusion	18	N/A	30
Injurytoanorgan	9	N/A	15
NeedforICU	13	N/A	32.6
Hospitalstay	60	6days	N/A
WoundInfection	15	N/A	25%
Death	nil	N/A	nil

Table 2 Comparison of intra operative variables between two groups

Variable	Mean		Pvalue
	GroupA (withnephrostomy)	GroupB(without nephrostomy)	
Intra operative bleeding	380ml	279ml	0.424
Surgery time	175min	133min	0.009*
Vasular injury	5(20.83%)	2(5.55%)	0.111

* Indicates statistically significant value

Table 3 Comparison of post operative variables between two groups

Variable	Mean		Pvalue
	GroupA (withnephrostomy)	GroupB(without nephrostomy)	
BloodTransfusion	16(66.7%)	2(5.5%)	0.018*
NeedforICU	9(37.5%)	1(2.78%)	0.042*
Hospitalstay	7.5days	5.2days	0.004*
Wound Infection	8(33.3%)	7(19.4%)	0.54

* Indicates statistically significant value

DISCUSSION

In our study we placed 24 (40%) nephrostomies out of which 18 were placed because of pyonephrosis and 6 because of an obstructing calculus. We did not report any mortality in our study, which is low compared to series of open nephrectomies due to non-functioning kidney reported in the literature.5This might be due to better quality of preoperative optimization, perioperative care, and expert surgical technique. The patients with a nephrostomy catheter on average had longer surgical time (175 min vs 130 min), which was statistically significant (p = 0.009), and at the same time had a greater need for intraoperative or postoperative blood transfusion, with a statistically significant difference (66.7% vs 5.5%, p = 0.0180) leading to increased hospital stay(7.5 days vs 5.2 days p = 0.0040) which was also statistically significant. The increased need for blood transfusion may be because of greater technical difficulty, with the presence of more fibrosis, and greater loss of anatomical structures secondary to the inflammation and chronic infection presented by patients with a nephrostomy. Also there was a significant statistical difference in terms of the need for intensive care (37.5%vs 2.8%, p 0.042). The need for increased admission to ICU in group A maybe because of the extensive blood loss and vascular injury involved. A similar retrospective study by Luis Daniel Carrillo et al had statistically significant differences in terms of intraoperative blood loss, need for blood transfusion and increased surgical time.[13] In our study the hospital stay was significantly longer in patients with a nephrostomy catheter (7.5 days vs 5.2 days p = 0.0040), the longer hospital stay as a result of fever and pain at the surgical site in most cases. No differences were found on comparing the 2 groups in terms of intraoperative blood loss(380mlvs 279 ml), surgical wound infection (33.3% and 19.4%) and intraoperative injury to an organ (20.83% vs 5.5%), even though these were highly prevalent in our population in both groups, demonstrating the great technical difficulty of simple nephrectomy in calculus disease. Greenstein et al studied patients undergoing nephrectomy with and without nephrostomy in 1999 and found that 77.7% of the patients with nephrostomy presented a surgical wound infection, whereas only 31.8% in the group without a nephrostomy catheter did so which was a statistically significant.[14] Greenstein et al concluded that the patients with a nephrostomy that was placed due to pyonephrosis or to alleviate an obstruction, who underwent a simple nephrectomy due to irreversible kidney damage, later on, had earlier and more frequent wound infections than patients who underwent the same procedure without a nephrostomy. Also we compared the nephrectomy in the nephrostomy group amongst themselves by dividing into two groups. One group with nephrectomy done 12 weeks post nephrostomy insertion (6 patients) and another group with nephrectomy done at 6 weeks post nephrostomy insertion(18 patients). On comparing both variables need for ICU(8 vs1) and need for transfusion(13 vs3) were more in those operated at 6 weeks post nephrostomy.[Table 4] In the present era of new laparoscopic and robotic techniques open nephrectomies are rarely performed, so there are very few studies in the literature that compare the results of open simple nephrectomies in patients with and without nephrostomy. However, in our subset of the population this technique still plays an important role in the treatment and our work found valuable information for the urologists who continue to perform the procedure.

Table 4 Comparison of variables in patients with nephrostomy for any cause

	DurationofNephrectomyinpatientswith nephrostomy	
	6weeks post nephrostomy Mean values	12weeks post nephrostomy Mean values
Intra operativebleeding	398.6ml	324ml
Surgery time	179.1min	162.5min
Injury toorgan	4	3
Blood Transfusion	13	1
Need for ICU	8	1
Hospitalstay	7.75days	6.75days
Wound Infection	7	1

CONCLUSION

Simple nephrectomy secondary to calculus with a nephrostomy is not simple but more complicated due to longer surgery time, longer duration of hospital stay, higher need for blood transfusions and ICU care. More meticulous technique and adequate preoperative optimization of the patient is a must before open nephrectomy secondary to calculus.

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