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INDICATIONS FOR PERCUTANEOUS NEPHROSTOMY IN PATIENTS WITH OBSTRUCTIVE UROPATHY DUE TO MALIGNANT UROGENITAL NEOPLASIAS

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ABSTRACT

Introduction: Urogenital neoplasias frequently progress with obstructive uropathy due to local spreading or pelvic metastases. The urinary obstruction must be immediately relieved in order to avoid deterioration in these patients. The percutaneous nephrostomy is a safe and effective method for relief the obstruction; however the indications of such procedures have been questioned in patients with poor prognosis.

Materials and Methods: A retrospective study was performed with 43 patients (29 female and 14 male) with urogenital neoplasias who were undergoing percutaneous nephrostomy during a 54-month period. The median age was 52 years. The primary tumoral site was the uterine cervix in 53.5% of patients, the bladder in 23.3%, the prostate in 11.6% and other sites in 11.6%.

Results: Postoperative complications occurred in 42.3% of the patients. There was no procedure-related mortality. Thirty-nine per cent of the patients died during the hospitalization period due to advanced neoplasia. The mortality rate was higher in patients with prostate cancer ($p = 0.006$), in patients over 52 years of age ($p = 0.03$) and in those who required hemodialysis before the procedure ($p = 0.02$). Thirty-two per cent of the patients survived long enough to undergo some form of treatment focused on the primary tumor. The survival rate was 40% at 6 months and 24.2% at 12 months. The percentage of the lifetime spent in hospitalization was 17.7%. The survival rate was higher in patients with neoplasia of the uterine cervix ($p = 0.007$) and in patients with 52 years of age or less ($p = 0.008$).

Conclusion: Morbidity was high in this patient group; however, the majority of patients could be discharged from hospital and followed at home. Patients under 52 years of age and patients with neoplasia of the uterine cervix benefited most from the percutaneous nephrostomy when compared to patients with hormone therapy-refractory prostate cancer, bladder cancer or over 52 years of age.

Key words: nephrostomy, percutaneous; ureteral obstruction; cervix neoplasms; bladder neoplasms; prostatic neoplasms
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INTRODUCTION

Despite recent advancements in surgical techniques, radiotherapy and chemotherapy for treatment of urogenital malignancies, these neoplasias often progress with obstructive uropathy due to local spreading or pelvic metastases (1-3). If the obstruction in the urinary tract is not removed, the patient's clinical conditions will deteriorate at a fast pace (3) through uremia, water-electrolyte abnormalities and

urinary infections with a consequent reduction of alertness and subsequent death (4-6).

Currently, retrograde ureteral clearing with double-J ureteral stents is the most widely used technique for relieving obstructions of the urinary tract (6). However, the retrograde ureteral stenting is frequently impossible in cancer patients due to the presence of anatomic deformities, bleeding or ureteral compression (1,3). On the other hand, percutaneous nephrostomy does not present technical difficulties even in cases where the retrograde ureteral clearing has failed (2,7).

The improvement in materials for percutaneous nephrostomy and uroradiological techniques, especially ultrasonography, has made this procedure safe and effective and suited for patients with obstructive uropathy (1,2), obtaining immediate improvement in the biochemical and laboratorial parameters of renal function (2).

Despite being a well-established and simple technique, percutaneous nephrostomy is not exempt from complications and can be associated with significant morbidity (2). Though the urinary shunt can prolong these patient's lives, it does not necessarily improve their quality of life (1,2,5). Many ethical, philosophical and emotional questions have been raised, which make the indication of nephrostomy even more complex in patients with poor prognosis (2,3,8). This study aims to assess which patients would have benefited most from undergoing percutaneous nephrostomy through a detailed analysis of outcome, morbidity, mortality and survival rates.

MATERIALS AND METHODS

Between January 2000 and July 2004, we retrospectively assessed 43 patients with malignant urogenital neoplasias who were undergoing unilateral or bilateral percutaneous nephrostomy. Twenty-nine patients were female and 14 were male. The median age was 52 years, (22 to 88 years). The primary site of the neoplasias is described on Table-1.

All patients had high blood urea nitrogen (BUN) and creatinine serum levels associated with bilateral hydronephrosis at the moment of nephrostomy. Ureteral obstruction and the obstruction degree were diagnosed through imaging exams, specifically ultrasonography or computerized tomography. The diagnosis of neoplasia was confirmed by biopsy in all patients. Twenty-two patients (51.2%) had a previous diagnosis and had already received some kind of treatment for the primary neoplasia before the procedure. In these patients, ureteral obstruction developed between 70 days and 8 years after the initial diagnosis, with a mean interval of 23.5 months. Twenty-one patients (48.8%) were diagnosed with neoplasia during hospitalization due to renal failure (recent diagnosis). Seventeen patients (37.2%) underwent hemodialysis before the surgical procedure due to acute pulmonary edema, hyperkalemia or refractory metabolic acidosis.

Table 1 – *Sites of primary tumors.*

Topography	N (%)
Uterine cervix	23 (53.5)
Bladder	10 (23.2)
Prostate	5 (11.6)
Others	
Ovary	3 (7)
Vulva	2 (4.70)
Total	43 (100)

A percutaneous nephrostomy was performed under general anesthesia in all patients. Patients were positioned in the horizontal ventral decubitus and the selected renal unit was punctured under ultrasonographic control with a 22-gauge Chiba needle. After observing the urinary reflux, a 50% iodinated water-soluble contrast medium was infused in order to delineate the renal calices. Under fluoroscopic monoplanar control at 90 degrees, a new infracostal puncture was performed with an 18-gauge Chiba needle at the posterior axillary line towards the lower or middle calices, and the pathway was dilated according to the Seldinger technique (9,10). Next, a 16 or 18F Foley catheter was inserted and its tip was positioned inside the renal pelvis, insufflating the balloon inside the calyx. All patients underwent descending pyelography at the end of the procedure in order to confirm the stent

Table 2 – *Diagnosis-related characteristics of different neoplastic sites.*

Neoplasias	Median Age (Years)	Previous Diagnosis N (%)	Recent Diagnosis N (%)	Interval Between Diagnosis and Nephrostomy (Months)
Uterine cervix	45	8 (34.8)	15 (65.2)	8.4
Bladder	67.5	5 (50.0)	5 (50.0)	4.9
Prostate	76	4 (80.0)	1 (20.0)	25.1
Others	49	5 (100)	0 (0)	39.6
Total	52.2	22 (51.2)	21(48.8)	23.5

location and drainage effectiveness. Patients were maintained under antibiotic prophylaxis with trimethoprim and sulfamethoxazole, and the catheter was changed every 30 days.

Patient follow-up ranged from 3 to 54 months, with a mean of 23.2 months. Tables-2 and 3 show data on diagnosis, mortality and patient survival according to the different neoplastic sites.

We assessed intraoperative mortality, the number of patients capable of receiving any kind of complementary treatment for their neoplasias, postoperative complications and the percentage of lifetimes spent in hospitalization of these patients. Factors such as the primary site of urogenital neoplasia, age, recent or previous diagnosis of neoplasia and the requirement for hemodialysis before performing the percutaneous nephrostomy were assessed as a function of intra-hospital mortality and survival. Statistical analysis was performed using the qui-square and Kaplan-Meier method using the "Statistical Package for the Social Sciences (SPSS)" software for Windows, version 10.0.

RESULTS

Of the 43 patients under assessment, significant improvement occurred in 28 patients (65.1%), and 17 patients (39.5%) presented normalization of their BUN and creatinine levels.

Seventeen patients (39.5%) died during the hospitalization period due to inevitable progress of their advanced neoplasias. There was no case of mortality related to the surgical procedure.

Among the 26 patients (60.5%) who were discharged from the hospital, 15 (57.7%) had to be readmitted due to complications related to the surgical procedure (Table-4) or to the progression of the underlying disease (Table-5). The mean percentage of the survival time spent in these hospitalizations was 17.7%.

Table 3 – *Characteristics in relation to mortality and survival.*

Neoplasias	Intra-hospital Mortality N (%)	Mean Survival 6 months (%)	Mean Survival 1 year (%)	Survival Time Spent in Hospitalization (%)
Uterine cervix	7 (30.4)	49.2	36.9	13.0
Bladder	4 (40.0)	40.0	10.0	24.8
Prostate	5 (100)	0	0	-
Other types	1 (20.0)	40.0	40.0	24.6
Total	17 (39.5)	40.0	24.2	17.7

Table 4 – *Postoperative complications related to the procedure.*

Complications	N (%)
Loss of catheter	8 (30.7)
Urinary tract infection	5 (19.2)
Skin infection	1 (3.85)
Hematuria	1 (3.85)
Total	11 (42.3)

Table 5 – *Postoperative complications related to progression of neoplasia.*

Complications	N (%)
Anemia	4 (15.4)
Obstructive acute abdomen	3 (11.5)
Deep venous thrombosis	2 (7.8)
Pneumonia	2 (7.8)
Digestive hemorrhage	1 (3.8)
Acute pulmonary edema	1 (3.8)
Total	13 (50)

Loss of the nephrostomy catheter was the most frequent postoperative complication in our sample. Eight patients presented complications, with 3 of them requiring a new procedure and the other 5 patients treated by simply repositioning the nephrostomy stent in the renal pelvis, since enough time had already elapsed in order to create a well-established path between the collecting system and the skin in these patients.

Five patients developed episodes of urinary tract infection. In 2 cases, nephrectomy was required due to pyonephrosis and peri-renal abscess.

Fourteen patients (53.8%) survived well enough to undergo some kind of treatment directed to the primary tumor. Mean survival at 6 and 12 months was, respectively, 40% and 24.2%. Figure-1 shows the accumulated survival probability for patients according to the Kaplan-Meier method.

When separately analyzed, according to the primary site of neoplasias, patient survival was statistically distinct in the different groups (Figure-2).

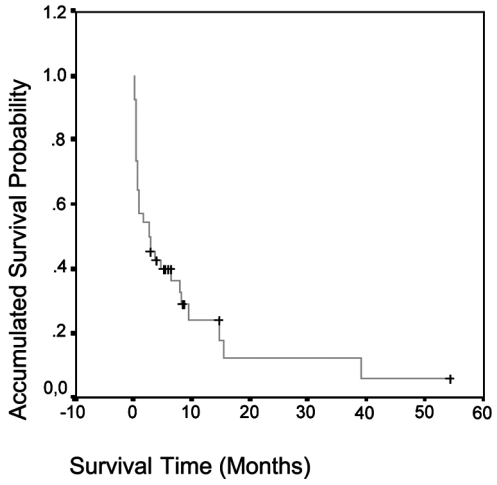

Figure 1 – *Survival of patients with urogenital neoplasias within a 54-month period.*

During the hospitalization for removing the urinary obstruction, the mortality rate was higher in patients with primary prostate neoplasia (p = 0.006), in patients over 52 years of age (p = 0.03) and in patients requiring urgent dialysis before the procedure (p = 0.02). There was no statistically significant difference between intra-hospital mortality and the time interval from the diagnosis of neoplasia until

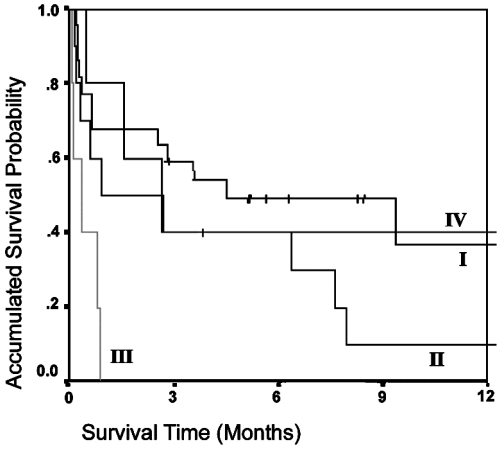

Figure 2 – *Survival according to primary site of neoplasias (I = uterine cervix, II = bladder, III = prostate, IV = other sites, p = 0.007.*

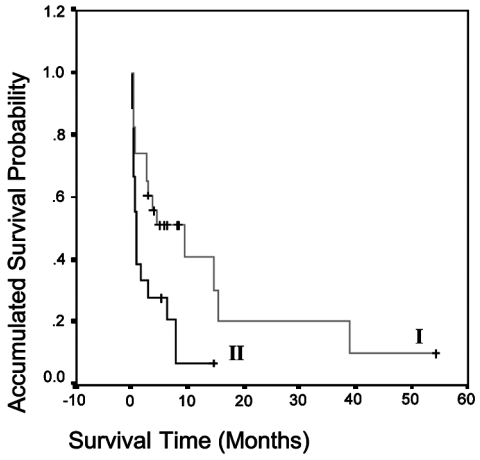

Figure 3 – *Survival of patients with 52 years of age or less (I), and patients over 52 years of age (II), p = 0.008.*

the nephrostomy (recent diagnosis vs. previous diagnosis, p = 0.37) or between other primary sites of neoplasias (p > 0.05).

Survival was better in patients with neoplasia of uterine cervix (Figure-2) and in patients with 52 years of age or less (Figure-3). There was no statistically significant difference in the survival of patients whose diagnosis of neoplasia was established before or during the hospitalization for percutaneous nephrostomy (Figure-4) or in those patients who required urgent dialysis or not before the procedure (Figure-5).

COMMENTS

Goodwin et al. (11) reported the first percutaneous puncture in 1955. Since then, percutaneous nephrostomy has been indicated for patients with unilateral or bilateral ureteral obstruction in several benign diseases where the retrograde urinary shunt is impossible, especially in the presence of infection or sepsis (2). This procedure is usually relatively safe, simple and fast, and presents low morbidity and mortality rates (1,2,4). Thus, many experts could feel a strong urge to perform this procedure in patients with cancer-derived obstruction before properly assessing each patient's individual situation (1-3,5). Though several authors advocate retrograde ureteral clearing, the occurrence of anatomic deformities, bleeding or ureteral compression associated with malignant neoplasias can prevent its accomplishment (1). Failure rates described for the procedure range from 40.6% to more than 80% (7,12).

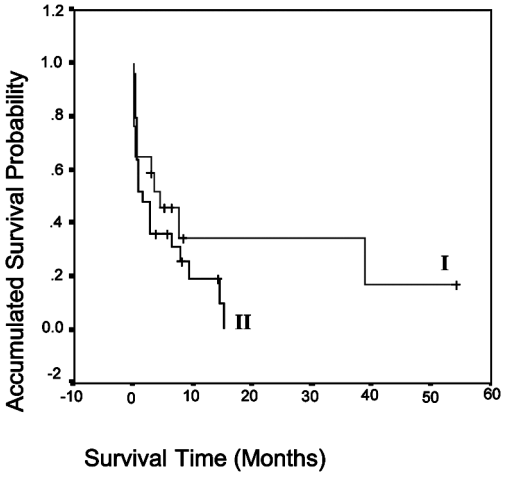

Figure 4 – *Survival of patients with previously diagnosed neoplasia (I), or neoplasia diagnosed during assessment for nephrostomy (II), p = 0.27.*

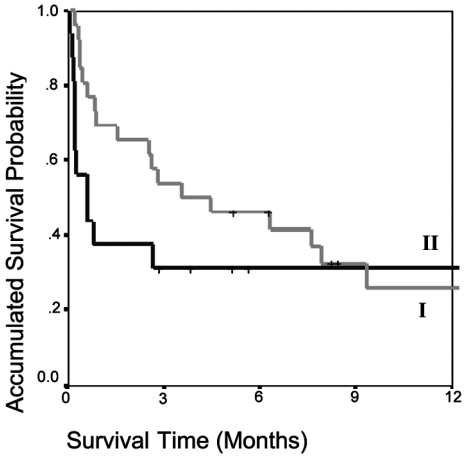

Figure 5 – *Survival of patients who did not require preoperative urgent dialysis (I) and patients who required preoperative dialysis (II), p = 0.33.*

Before the advent of recent endourology techniques, patients with locally advanced or metastatic urogenital neoplasias underwent open nephrostomy and presented high morbidity and mortality rates (7,8); however, even after the advent of the percutaneous nephrostomy, morbidity and mortality rates have remained high in this group of patients (1,2,5). The procedure's main complications include urinary tract infections, obstruction and loss of the nephrostomy catheter (9). Complication rates in our patients were 42.3% and hospitalization was often required.

Such results and the subsequent pain and suffering caused by prolonging the life time of these patients must be carefully considered before performing percutaneous nephrostomy. It raises doubts as to which patients would have longer survival and better quality of life after clearing the urinary tract.

The primary site of the neoplasia is a factor that can significantly influence patient survival rates (3). Ureteral obstruction associated with prostate and uterine cervix cancer usually has a better outcome than other types of neoplasia (3,6,8), with an increment of 1 year or more in approximately 60% of patients (8). In our study, we observed a statistically significant difference in the survival of patients with different primary sites. Patients with cervix carcinoma showed better survival rates, while patients with prostate adenocarcinoma and bladder cancer had poorer prognoses. All our patients with prostate cancer died during the hospitalization for percutaneous nephrostomy. These patients were marked by advanced and aggressive disease, and 80% of them had previously undergone an orchiectomy and presented hormone therapy-refractory disease. In studies showing better prognosis for patients with prostate cancer, the majority of such patients had not yet received hormone therapy. Thus, similarly to other studies that recommend avoiding ureteral clearing in patients who develop obstructive uropathy during hormone therapy (7,8), we observed higher mortality and lower survival rates in this group of patients.

Another major factor that must be taken into account is the patient's age (1,3,10). Young patients usually have larger metabolic and immunologic resources for recovery during the immediate postoperative period after percutaneous nephrostomy and to respond to subsequent complementary treatments. We observed a lower in-hospital mortality rate and longer survival in patients under 52 years of age.

There seems to be little doubt about the benefits of percutaneous nephrostomy for patients with newly-diagnosed disease, allowing them more time for a proper staging and introduction of the specific treatment (1,3,4,6). However, we found no statistically significant difference between newly diagnosed patients and those previously diagnosed with neoplasia. These results, however, should be carefully analyzed, since patients with previously diagnosed neoplasia presenting a long interval between the diagnosis and the ureteral obstruction show low potential for progression and it can be a long time until the neoplasia's final outcome (1,4). In our sample, the mean interval between diagnosis and ureteral obstruction was 23.5 months.

Patients previously treated for primary neoplasia that can still be properly treated with other therapeutic modalities, especially chemotherapy and hormone therapy, can also benefit from the procedure (3). Relieving the ureteral obstruction allows the patient to undergo surgery, aggressive chemotherapy or hormone therapy for treating most cases of urogenital cancer. However, the majority of advanced neoplasias whose progression is enough to cause ureteral obstruction, at least currently, are refractory to any therapeutic modality. In the future, advances in radiotherapy and chemotherapy can enable a more effective treatment for these neoplasias and strengthen the role of the percutaneous nephrostomy in these patients (1,4).

The need for urgent hemodialysis before the percutaneous nephrostomy increased the intra-hospital mortality rate but did not change the long-term survival rate of patients. Probably, the higher intra-hospital mortality in these patients is due to the fact that, in general, patients requiring hemodialysis present more severe clinical conditions than patients who have not developed uremic complications and do not need hemodialysis. Thus, if indicated, the nephrostomy should be performed as soon as possible before the development of such complications in order to avoid an increase in mortality for these patients. Patients that have undergone dialysis and

survived to hospitalization show a survival rate that is similar to patients who did not undergo dialysis.

However, the main factor that should guide the urologist's management is patient desire (1,3,6,10). Some patients may refuse the nephrostomy despite being good candidates. Others may wish to prolong life even for a short time due to emotional, legal or financial reasons, and this wish must be respected. However, patients and their families must be completely informed about the palliative role of surgery for removing the obstruction, the disease's prognosis and potential complications of the procedure (3,5,6,8,9).

There is no advantage in performing the percutaneous nephrostomy in patients with unilateral ureteral obstruction because survival in these patients is not better than in cases where the procedure is performed only after the development of bilateral obstruction (8).

In the presence of bilateral obstruction, we have recommended that only 1 side be cleared of the obstruction, since bilateral nephrostomy brings significant problems regarding the patient's quality of life (5,13). The side to be cleared from the obstruction is usually the one with less pyelocaliceal dilation and greater cortical thickness where better renal function is expected.

The presence of an external drainage collector certainly reduces the patient's quality of life as well (5,14), despite allowing the patient to stay at home. Thus, some authors have suggested that following the proper renal shunting with percutaneous nephrostomy and improvement in renal function parameters, the physician can try to transpose the ureteral obstruction with an internal ureteral catheter by antegrade access, providing significant improvement in the patient's quality of life since he/she will not have to adjust to a permanent external drainage catheter (2,5,7,8,13). This procedure has been reported with low morbidity and high success rates (7).

A subcutaneous shunt by percutaneous access with nephrovesical stents, which divert the urinary tract with no need for manipulating the obstructed ureter, is also a therapeutic option for these patients (14).

Patients with uncontrolled pain, low functional status, significant co-morbidities, and disseminated disease with no possibility of treatment are clearly unfavorable candidates for urinary clearing due to the poor quality of life experienced by such patients following the procedure (2,3).

CONCLUSION

The morbidity of percutaneous nephrostomy was high in this group of patients with urogenital neoplasia. However, there was significant improvement in renal function parameters in the majority of patients, allowing them to be discharged from the hospital and stay at home for most of their remaining survival time. There was no procedure-related mortality; however, mortality due to progression of the neoplasia was considerable.

In our sample, patients who benefited most from the percutaneous nephrostomy were those under 52 years of age and with cervical neoplasia, when compared with prostate cancer patients who developed obstructive uropathy during hormone therapy, patients with bladder cancer, and patients over 52 years of age.

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