CLINICAL COURSE IN PATIENTS WITH PERCUTANEOUS NEPHROSTOMY FOR HYDRONEPHROSIS ASSOCIATED WITH ADVANCED CANCER

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We investigated the clinical courses of 33 patients with advanced malignancies who has undergone percutaneous nephrostomy (PNS) to clarify the efficacy and validity of PNS and evaluated the results according to the type of catheter.

The pigtail, Malecot and balloon catheters were used. All the catheters were exchanged every 4 weeks, if necessary for larger ones. The site of the primary disease, preoperative performance status, duration of time spent at home after PNS construction, number of times the catheter was changed, type and size of the catheter and complications associated with PNS were compiled.

The median overall survival was 3.0 months. Twenty-three patients (69.7%) were never discharged from hospital. Thirty patients died of their primary diseases. The median overall survival of patients with cancers of the upper gastrointestinal system, large bowel, urological organs and gynecologic organs were 1.5, 5.5, 3.0 and 3.0 months, respectively ($p=0.0116$). Eighteen patients (54.5%) experienced complications such as pyelonephritis, obstruction, dislodgement and so on.

PNS is an appropriate urinary diversion for patients with hydronephrosis with advanced cancer and unilateral construction is effective for treating end-stage obstructive renal failure. However, PNS rarely improves the patient's quality of life and the risk of complications is unavoidable regardless of the type of catheter used.

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Key words : Percutaneous nephrostomy, Malignant disease, Ureteral obstruction, Hydronephrosis, Renal failure

INTRODUCTION

Urologists are often consulted concerning patients with ureteral obstruction secondary to advanced malignant diseases. Such patients tend to have poor prognoses owing to the primary diseases[1]; therefore palliative procedures for urinary drainage are performed to relieve symptoms and to avoid lethal status caused by hydronephrosis. Percutaneous nephrostomy (PNS) is commonly performed for these patients when the transurethral procedure of indwelling ureteral stents is not successful. While PNS is a safe and effective procedure[2], the efficacy for these patients is still unclear. Patients with PNS often suffer from complications related to catheters that can affect their quality of life. Seventy percent of patients with PNS placed for more than one month experienced complications[2]; therefore it is questionable whether PNS is appropriate for permanent urinary diversion. In addition various types of catheters such as the pigtail, Malecot and nephrostomy balloon are commonly used for PNS. However, it is unclear which type is the best for such patients. We investigated the clinical courses of patients with advanced malignancies who underwent PNS to clarify the efficacy and validity of this management. We also evaluated the effects of the type and size of catheter.

MATERIALS AND METHODS

Thirty-three patients with advanced malignant diseases underwent percutaneous nephrostomy as a permanent urinary diversion for hydronephrosis which occurred due to metastasis or invasion of the primary disease from January 1991 to May 2003 at our institution. The procedure was performed to prevent the progression to lethal renal failure in 15 patients (45.5%), to cure uremia in 8 (24.2%), to relieve symptoms such as fever and back pain in 4 (12.1%), to perform chemotherapy with nephrotoxic agents in 4 (12.1%) and to examine the cause of hyrdonephrosis in 2 (6.1%). Nephrostomy was placed bilaterally only in patients whose serum creatinin did not sufficiently decrease or whose symptoms were not relieved after unilateral placement. Catheters were placed by ultrasound-guided percutaneous puncture using an 18 or 22-gauge needle followed by insertion of a guide wire and dilation of the tracts. Polyurethane pigtail catheters (Cook Urological, Spencer, USA) were used (8.3 Fr in 16 cases and 10 Fr in 1 case) for initial placement and 12 Fr all silicone malecot catheters (Create Medic,

Yokohama, Japan) were used in 16 cases. Some of them were changed to all silicone nephrostomy balloon catheters (Create Medic, Yokohama, Japan) 2 to 4 weeks later. In principle, all the catheters were changed every 4 weeks, if necessary to larger ones.

The site of the primary disease, preoperative performance status, pre- and postoperative serum creatinin, duration of time spent at home after PNS construction, number of times the catheter was changed, type and size of catheter and complications associated with PNS were compiled. Performance status was evaluated using Koyama-Saito criteria.

Survival rate was analyzed by the Kaplan-Meier method and compared with the log-rank test according to the site of the primary disease. The difference between pre- and postoperative serum creatinin was evaluated using the Wilcoxon signed-ranks test. Differences with a $p<0.05$ were considered statistically significant.

RESULTS

Characteristics of the patients are shown in Table 1. Median overall survival duration after construction of the PNS was 3.0 months. The gastrointestinal system was the most frequent site of primary disease. In 2 cases of unidentified primary disease with peritonitis carcinomatosis, the origin was considered to be gynecological cancer from the clinical features. The mean serum creatinin level before PNS construction was 3.60 mg/dl. Of 30 patients with bilateral hydronephrosis 25 underwent nephrostomy unilaterally and 5 bilaterally. Of 3 patients with a solitary kidney, one had a contralateral contracted kidney and 2 previously underwent nephroureterectomy for urothelial cancer of the upper urinary tract. Twenty-three patients (69.7%) could not be discharged from hospital after placement of the nephrostomy. Thirty patients (90.9%) died during the follow-up period. Of them only one died of complications associated with the nephrostomy, sepsis due to pyelonephritis related to the indwelling catheter.

Fig. 1 shows the Kaplan-Meier overall survival. The median overall survival of patients with cancer of the upper gastrointestinal system including gastric, bile duct and pancreas, large bowel, urological and gynecologic organ cancers were 1.5, 5.5, 3.0 and 3.0 months, respectively. The survival duration of the patient with lung cancer was 2.5 months. Patients with cancer of the upper gastrointestinal system had a significantly shorter survival duration than patients with other primary diseases ($p=0.0116$).

The serum creatinin level was significantly improved after the construction of PNS ($p<0.0001$, Fig. 2). In 4 patients who presented with fever or back pain preoperatively, all the symptoms were improved postoperatively. All 4 patients could receive chemotherapy as planned preoperatively.

Table 1. Patients' characteristics

Total No. of patients	33 (male 18, female 15)
Mean age	69.2
Mean follow-up duration (months)	5.92
Median overall survival duration (months)	3.0
Primary disease (%)	
Gastric	5 (15.2)
Colon, rectum	8 (24.2)
Pancreas	2 (6.1)
Bile duct	1 (3.0)
Ovary	1 (3.0)
Cervix	3 (9.1)
Corpus	2 (6.1)
Unknown site of gynecological organ	2 (6.1)
Upper urinary tract	3 (9.1)
Prostate	5 (15.2)
Lung	1 (3.0)
Performance status (%)	
Grade 0	0 (0)
Grade 1	18 (54.6)
Grade 2	11 (33.3)
Grade 3	3 (9.1)
Grade 4	1 (3.0)
Mean serum creatinin at presentation (mg/dl)	3.60 (0.8–10.0)
No. solitary kidney patients	3 (9.1)
No. bilateral nephrostomy patients (%)	4 (12.1)
No. of patients spending time at home (%)	10 (30.3)
Mean duration at home (months)	1.92
Mean no. of changes of catheter per patient	5.0
Cause of death (%)	
Total	30 (100)
Primary malignancy	28 (93.4)
Pneumonia	1 (3.3)
Pyelonephritis	1 (3.3)

Table 2 shows the number of times catheters were changed, types of catheters that were used, and complications associated with nephrostomy. A 14 Fr nephrostomy balloon catheter was used most frequently. Overall 18 patients (54.5%) experienced complications. Pyelonephritis and catheter obstruction were representative complications, of which 13 and 11 episodes were observed, respectively.

DISCUSSION

Patients with hydronephrosis associated with advanced cancer tend to have a poor general status and other metastatic lesions. Therefore palliative procedures of urinary diversion are commonly performed[1] Most urologists try intraureteral stenting as the first choice, which is likely to fail for patients with extrinsic ureteral obstruction[3]. Stenting also results in a high rate of urinary tract

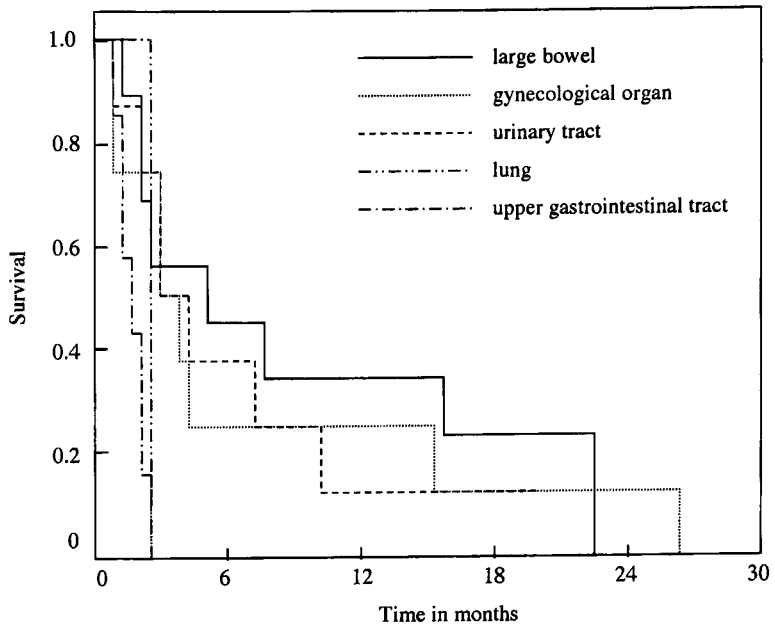

Fig. 1. Kaplan-Meyer overall survival estimates according to the site of the primary malignancy in patients who underwent PNS for hydronephrosis. Survival duration in patients with cancer of the upper gastrointestinal system was significantly shorter than that in patients with other primary diseases.

infection that often causes urosepsis[4].

The median survival of patients with PNS for advanced cancer has been reported to be 13 weeks[5] and 112 days[1], both similar to our result. None of the patients died of obstructive renal failure. Although some patients have a relatively long survival, the survival period is difficult to predict. We believe that aggressive procedures of urinary diversion are not necessary in most cases as described by Lev-Chelouche et al.[6] Unilateral PNS is effective for treating life-threatening obstructive renal failure. Bilateral drainage can improve renal function more[4], and may be necessary when the patient is to receive anti-cancer chemotherapy with nephrotoxic agents.

In this study, although none of the patients died of renal failure, survival could be prolonged for only a few weeks for most patients. In terms of survival prolongation, construction of a PNS may not be beneficial for all patients. On the other hand, all 4 patients could receive the planned anti-cancer chemotherapy and symptoms associated with hydronephrosis were relieved owing to construction of the PNS; therefore, PNS can be beneficial in such cases.

In previous studies there was no difference in survival duration according to the primary disease[1,7] On the other hand, patients with carcinomatosis had a particularly poor prognosis[5] In patients with intrapelvic malignancies, local invasion or lymph node metastasis may cause hydronephrosis, while hydronephrosis with upper gastrointestinal tract cancer is probably associated with peritoneal dissemination. That is why the patients with upper gastrointestinal tract cancer had a shorter survival in this study.

In this study about 70% of the patients were never discharged from the hospital which was a much higher level than in previous studies (15–37%)[5,7,8]. The indication for hospitalization usually depends on the physician treating the primary disease. Shekarriz et al. reported that only 15% in their series never left hospital; while 52% of overall survival duration was spent in the hospital[1]. These results suggest that PNS rarely contributes to improving the patients' quality of life. Urologists and interventional radiologists should sufficiently consider this point before construction.

Over 50% of the patients experienced complications, and one patients had a lethal complication. Watanabe et al. reported that the complication rate in patients with PNS placement for more than one month was 69%[2] Complications are actually unavoidable and they often cause suffering; therefore the patient needs to be well-informed about these complications.

Although a 14 Fr nephrostomy balloon catheter was used most frequently, this type had a trend to have a lower rate of complications. Fallon et al. reported that the pigtail catheter was less likely to be obstructed and pulled out[8]; however, obstructions were often observed in this study. Dislodgement of the Malecot catheter and nephrostomy balloon catheter sometimes occurred. The Malecot catheter has a tendency to be pulled out, probably due to its rigidity. Dislodgment that occurs immediately after

Figure 2

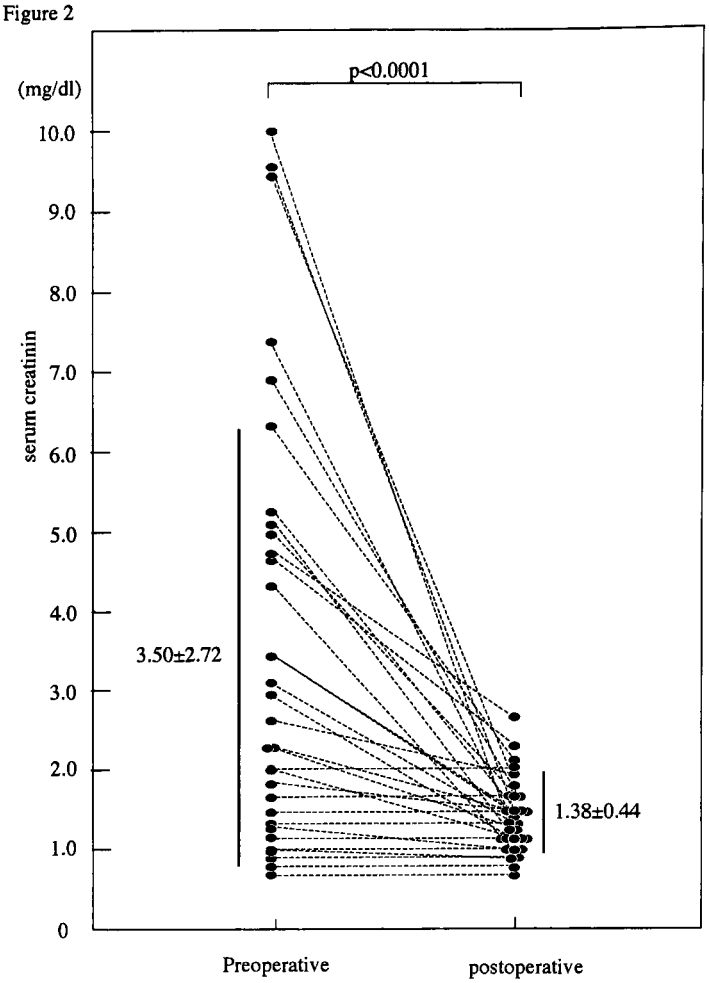

Fig. 2. Mean pre- and post operative serum creatinin levels ±SD were 3.50±2.72 mg/dl and 1.38±0.44 mg/dl respectively. There was a significant difference between them.

Table 2. Types of catheter, the number of times catheters were changed and complications

Type	Size (Fr)	No. used (times)	Complication (times)
Pigtail	8.3	31	Pyelonephritis (3), obstruction (3)
	10	1	
Malecot	10	3	
	12	28	Pyelonephritis (3), dislodgement (2)
	14	9	Pyelonephritis (2)
Balloon	12	24	Pyelonephritis (3), obstruction (3)
	14	109	Pyelonephritis (2), obstruction (5), dislodgement (5), removal by Pt (1)
	16	9	Pyelonephritis (1), dislodgement (1)
	18	2	

construction is a troublesome complication that occasionally necessitates reconstruction. We should be careful about dislodgment of Malecot catheters and obstruction of pigtail catheters, especially at the time of construction.

CONCLUSION

PNS is appropriate urinary diversion for patients with hydronephrosis with advanced cancer and unilateral construction is effective enough to treat lethal obstructive renal failure. However, PNS rarely improves the patient's QOL and the risk of complications is unavoidable regardless of the type of catheter used.

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和文抄録

経皮的腎瘻を造設した水腎症合併進行癌症例の検討

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［目的］水腎症を合併した進行癌患者に対しては経皮的腎瘻（PNS）を行うことが多いが，その有用性，必要性について十分な検討はされていない．また，使用すべきカテーテルの種類についても一致した見解は得られていない．水腎症を合併した進行癌患者に対する PNS の有用性，必要性を明らかとするため臨床経過につき検討した．また，カテーテルの種類と合併症との関係についても併せて検討した．

［方法］PNS を造設した水腎症合併進行癌症例33例につき検討した．カテーテルは pigtail カテーテル，Malecot カテーテル，腎盂バルーンカテーテルが用いられた．カテーテルは原則として4週ごとに交換することとし，必要に応じ大きい径のものを使用することとした．原疾患の種類，PNS 造設前の performance status（PS），PNS 造設後の在宅期間，カテーテル交換回数，カテーテルの種類，合併症につき調べた．

［結果］生存期間中央値は3.0カ月であった．全症例の69.7％は退院が不可能であった．30例は原疾患により死亡していた．原疾患別の生存期間中央値は上部消化管癌，大腸癌，泌尿器科癌，婦人科癌でそれぞれ1.5，5.5，3.0，3.0カ月であった（$p=0.0116$）．18例（54.5％）で腎盂腎炎，カテーテル閉塞，カテーテル抜去などの合併症を経験していた．カテーテルの種類と合併症頻度に関連は見られなかった．

［結論］PNS は水腎症合併進行癌症例に対し適した尿路変向術であり，一側の造設により致死的な腎後性腎不全を回避できる．しかし必ずしも患者の QOL 改善は期待できず，いかなるカテーテルを用いても合併症のリスクは不可避であると考えられた．

（泌尿紀要 **50**：457-462，2004）