

The Comparison of Clinical Outcomes Between DJ Stent Insertion and Percutaneous Nephrostomy in Patients with Obstructive Uropathy due to Cervical Cancer

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ABSTRACT

Background: Metastatic cervical cancer into the ureter may lead to obstructive uropathy due to mechanical ureteral blockage. The insertion of a double J (DJ) stent and percutaneous nephrostomy (PCN) are some options that can be offered to the patients, but until now the comparison between these two procedures is still debated. **Aim:** The aim of the study is to compare the clinical outcomes of DJ stent insertion and PCN in the management of uropathy obstructive secondary to cervical cancer. **Materials and Methods:** This study is an analytical observation with a retrospective cohort design. We analyzed the difference in clinical outcomes between the two procedures such as 24-hour renal function, the number of visits due to procedure or device related complications, quality of life and overall survival in patients with stage 3B cervical cancer. **Results:** We collected 108 patients with uropathy obstructive secondary to stage 3B cervical cancer from January 2019 to July 2021, of which 54 underwent DJ stents insertion and 54 underwent PCN. There was no difference in the improvement of renal function between the two procedures ($p=0.184$), as well as on the parameters of quality of life ($p=0.909$) and overall survival ($p=0.582$). We found a significant difference in patient visits to the hospital due to procedure related complications. Patients who have a DJ stent inserted are more often come to the hospital because of fever and pain compared to patients who have PCN procedures ($p=0.027$). **Conclusion:** Percutaneous nephrostomy is superior to DJ stent insertion in terms of procedure related complications. However, an individualized approach regarding the most appropriate procedure in palliative care patients should be recommended.

Keywords: cervical cancer; DJ stent; percutaneous nephrostomy; obstructive uropathy

INTRODUCTION

Cervical cancer is one of the diseases that account for the highest mortality rate in the world. In cases of advanced cervical cancer, obstructive uropathy is a common complication that can increase morbidity and mortality. Drainage using a DJ stent insertion or percutaneous nephrostomy are the two most common procedures that are performed to overcome this problem. Most patients considered a DJ stent to be more comfortable because no tube was visible. On the other hand, nephrostomy is technically has fewer complications than DJ Stent [1]. Standard guidelines for selecting the optimal urinary diversion technique do not yet exist because of the controversy that the decision for each patient should be personalized.

Here we analyze the differences in clinical outcomes between these two procedures in treating patients with obstructive uropathy due to cervical cancer.

METHODS AND PROCEDURES

This is a retrospective cohort observational study using data from the medical records of Prof. Dr. I.G.N.G Ngoerah Hospital from January 2019 to July 2021. This study included patients diagnosed who were diagnosed with stage 3B cervical cancer and obstructive uropathy. Decision about choose of DJ stent insertion or percutaneous nephrostomy was made by patients themselves after fully informed pros and cons of these two-different operative methods.

The exclusion criteria were patients who lost to follow-up and had autoimmune disease. We analyzed the difference in clinical outcomes between the two procedures such as 24-hours renal function, the number of visits due to the procedure or device-related complications, quality of life, and overall survival in one year follow-up. This study was approved by the research ethics committee of the Faculty Medicine, Udayana University Prof. Dr. I.G.N.G Ngoerah Hospital Denpasar (No. 1484/UN 14.2.2VII.14/LT/2021).

Data analysis is conducted using SPSS Version 23 for windows with t-test, Mann Whitney, 1-year overall survival test, and semi-parametric Cox proportional hazard regression test.

RESULTS

The age range was from 28 to 78 years, with a mean age of 55.1 ± 10,6 years in group nephrostomy patients and 51.9 ± 9.3 years in group DJ stent patients (p=0,083). All the patients were evaluated in terms of DM and CKD preoperatively, and found no significant difference between the groups. The data by percentage, mean value, and standard deviation are shown in Table 1.

TABLE 1: Characteristics of Subjects Based on Research Groups.

Variable	Group						p-value
	Nephrostomy			DJ Stent			
	(n=54)	Minimum-maximum	P**	(n=54)	Minimum-maximum	P**	
Age (years)	55.1±10.6	28-78	0.051†	51.9±9.3	35-77	0.164†	0.083*
DM							
- Yes	3 (5.6%)		<0.001	2 (3.7%)		<0.001	0.649***
- Not	51 (94.4%)			52 (96.3%)			
CKD							
- Yes	29 (53.7%)		<0.001	24 (44.4%)		<0.001	0.336***
- Not	25 (46.3%)			30 (55.6%)			

* Independent t-test

** Kolmogorov-Smirnov test: age data in the form of mean±SD, Stage, CKD, and DM in percentage

*** Mann Whitney U test

† Significant

The 24 hours postoperative clinical outcomes in terms of kidney function are shown in Table 2. The mean serum creatinine (SCr) in nephrostomy groups was 0,3-14,6 while in the DJ stent groups was 0,4-10,1 (P=0,134).

Meanwhile, the glomerular filtration rate (GFR) after nephrostomy was 1.8-183 And after DJ stent was 4.1-135.3 (p=0,184). We did not find any statistically significant difference in kidney function after the procedures in the two groups.

TABLE 2: Differences in kidney function in nephrostomy and DJ stent.

Variable	Group						p-value
	Nephrostomy			DJ Stent			
	(n=54)	Minimum-maximum	P**	(n=54)	Minimum-maximum	P**	
BUN mg/dL	32.8 (56)	3-202.6	0.003	22.1 (31.3)	2.2-123.3	<0.001	0.096***
SCr mg/dL	2.6 (3.5)	0.3-14.6	0.001	1.5 (2)	0.4-10.1	<0.001	0.134***
GFR mL/min	27.5 (65.3)	1.8-183	<0.001	43.1 (59.5)	4.1-135.3	<0.001	0.184***

** Kolmogorov-Smirnov test: BUN, SCr, GFR in the median (interquartile range); *** Mann Whitney U test

The postoperative complications are shown in Table 3. The number of arrivals to the hospital after the nephrostomy procedure was 0.5 (1) times compared to those patients in the DJ stent group, which was 2 (4) times (p=0,027).

The number of patients who developed a fever after nephrostomy procedure was lower compared to the group that underwent DJ stents (14 (25.9%) vs. 6 (11,1%), p=0,049). There is no difference between the number of patients who experienced hematuria after the procedure in both groups (p=0,590).

Patients in the nephrostomy group less frequently experienced pain than patients in the DJ stent group (18 (33,3%) vs. 29 (53,7%), p=0,034).

TABLE 3: Differences Number of Arrivals Related to Postoperative Complications between DJ Stent Insertion and Percutaneous Nephrostomy.

Variable	Group						p-value
	Nephrostomy			DJ Stent			
	(n=54)	Minimum-maximum	P**	(n=54)	Minimum-maximum	P**	
Number of arrivals	0.5 (1)	0-4	<0.001	2 (4)	0-6	<0.001	0.027†***
Postoperative complications							
Painful	18 (33.3%)		<0.001	29 (53.7%)		<0.001	0.034†***
Hematuria	7 (13%)		<0.001	9 (16.7%)		<0.001	0.590***
Fever	6 (11.1%)		<0.001	14 (25.9%)		<0.001	0.049†***

** Kolmogorov-Smirnov test: BUN, SCr, GFR in the median (interquartile range); *** Mann Whitney U test

Table 4 presents the EORTC QLQ-C30 score for global health status, functional scales, and symptom scales/items. We found no significant differences in global health status (Nephrostomy group 42.90 ± 21.13 vs. DJ stent group 43.20 ± 24.21, p=0,909) and functional (Nephrostomy group 336,21 ± 107,11 vs. DJ stent group 354,31 ± 106,47) parameters between the two groups after procedures. On the symptom scale parameters in terms of fatigue (16.36 ± 15.35 vs. 16.04 ± 16.50,p=0,835) nausea and vomiting

(14.51 ± 16.52 vs. 15.74 ± 22.05,p=0,668) dyspnea (14.20 ± 16.63 vs. 12.96 ± 16.71,p=0,607) insomnia (17.59 ± 18.72 vs. 13.27 ± 16.94,p=0,197) loss of appetite (17.90 ± 19.92 vs. 13.27 ± 16.94,p=0,216) constipation (4.94 ± 9.51 vs. 5.32 ± 10.65,p=0,917) diarrhea (3.08 ± 7.98 vs. 4.32 ± 9.81,p=0,569) financial difficulties (21.61 ± 16.70 vs. 21.30 ± 16.32 ,p= 0,964) found no difference, but we found differences in terms of pain (10.80 ± 12.18 vs. 23.76 ± 27.39,p=0,039).

TABLE 4: Quality of Life in Cervical Cancer Patients after DJ Stent Insertion with Percutaneous Nephrostomy.

Quality of life domain	Group										p-value*
	Nephrostomy					DJ Stent					
	Mean	SD	Median	Min	max	Mean	SD	Median	Min	Max	
Global health status (quality of life)	42.90	21.13	50	16.67	83.33	43.20	24.21	41.67	16.67	83.33	0.909
Function Scale											
Physical function	55.86	24.04	50	16.67	100	65.73	26.18	66.67	16.67	100	0.045†
Role Function	60.43	24.49	66.67	16.67	100	64.20	25.16	66.67	16.67	100	0.417
Emotional Function	62.90	25.83	66.67	16.67	100	62.04	23.22	66.67	16.67	100	0.829
Cognitive Function	97.53	8.19	100	66.67	100	98.46	6.68	100	66.67	100	0.469
Social Function	59.50	24.56	66.67	16.67	100	63.88	25.23	66.67	16.67	100	0.341
Total function scale	336.22	107.11				354.31	106.47				
Symptom Scale											
Fatigue	16.36	15.35	0	16.67	66.67	16.04	16.50	16.67	0	50	0.835
Nausea and Vomiting	14.51	16.52	8.34	0	66.67	15.74	22.05	0	0	66.67	0.668
Painful	10.80	12.18	8.34	0	33.33	23.76	27.39	16.67	0	83.33	0.039†
Out of breath	14.20	16.63	16.67	0	66.67	12.96	16.71	0	0	50	0.607
Hard to sleep	17.59	18.72	16.67	0	66.67	13.27	16.94	0	0	50	0.197
Loss of appetite	17.90	19.92	16.67	0	66.67	13.27	16.94	0	0	50	0.216
Constipation	4.94	9.51	0	0	33.33	5.25	10.65	0	0	33.33	0.917
Diarrhea	3.08	7.98	0	0	33.33	4.32	9.81	0	0	33.33	0.569
Financial difficulties	21.61	16.70	16.67	0	66.67	21.30	16.32	16.67	0	50	0.964
Total Symptom scale	120.99	133.51				125.91	153.31				
Quality of life score	500.13	237.26				523.24	305.77				
Interpretation of quality of life	Mild					Mild					

*Mann Whitney U test; †significant

Result of level difference 1-year overall survival the patient died and lived after installing a DJ stent with percutaneous nephrostomy in a case of obstructive uropathy due to cervical cancer in Figure 1 and Table 5.

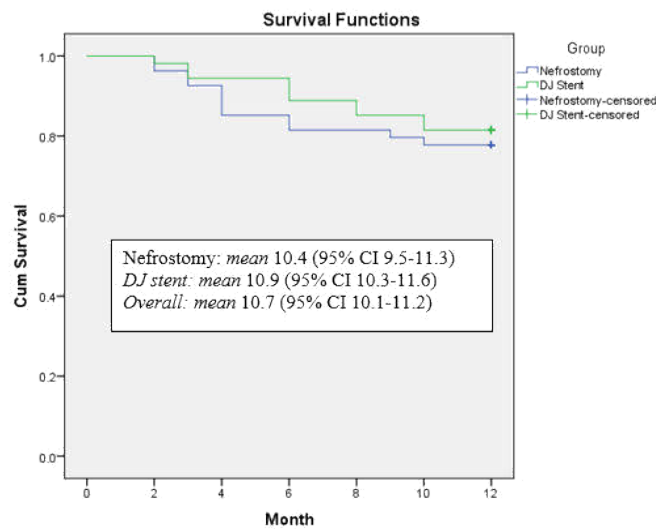


FIGURE 1: Kaplan Meier Curve 1-Year Overall Survival Nephrotomy and DJ Stent.

TABLE 5: Differences in Death and Life in Patients with Nephrostomy and DJ Stent.

Survival	Nephrostomy	DJ Stent	Total	p*
Die	12 (22.2%)	10 (18.5%)	22 (20.4%)	0.582
Life	42 (77.8%)	44 (81.5%)	86 (79.6%)	

* overall comparison log-rank (mantel-cox)

The results of a study on the level of 1-year overall survival after the installation of a DJ stent with percutaneous nephrostomy in obstructive uropathy due to cervical cancer showed that in nephrostomy patients where patients died from nephrostomy as many as 12 (22.2%), where the average survival was 10.4 months in 95% CI with an estimated mean interval of 9.5-11.3 months and 10 (18.5%) deaths in respondents with DJ Stent where the mean survival is 10.9 months at 95% CI with an estimated mean interval of 10.3-11.6 month.

The overall data results in both groups who died were 22 (20.4%) where the mean survival was 10.7 months at 95% CI with an estimated mean interval of 10.1-11.2 months and from the results in patients with CKD OR 8,520 (95% CI, 1,911-37,978; p 0.005) which means that patients with CKD have a risk of dying of 8,520 times greater with a range of 1,911-37,978 times.

This research was also carried out the non-proportional hazard cox regression method to determine how independent factors affect survival in the two groups is obtained in Table 6.

TABLE 6: Cox Regression Method Test Analysis of Non-Proportional Hazard.

Characteristics	Adjusted OR	95% CI	P*
Step 1			
Age	2.092	0.742-5.900	0.163
Kidney function	1.267	0.752-2.134	0.374
CKD	6.035	0.616-59.136	0.123
DM	1.352	0.287-6.363	0.703
Painful	1.124	0.428-2.954	0.813
Fever	1.145	0.470-2.790	0.765
Hematuria	.583	0.160-2.128	0.414
Step 2			
Age	2.039	0.739-5.626	0.169
Kidney function	1.254	0.749-2.099	0.389
CKD	6.592	0.755-57.594	0.088
DM	1.407	0.309-6.416	0.659
Fever	1.148	0.472-2.794	0.761
Hematuria	.578	0.159-2.102	0.405
Step 3			
Age	2.046	0.742-5.642	0.167
Kidney function	1.262	0.758-2.102	0.371
CKD	6.880	0.812-58.320	0.077
DM	1.417	0.313-6.421	0.651
Hematuria	.570	0.157-2.066	0.392

Characteristics	Adjusted OR	95% CI	P*
Step 4			
Age	2.120	0.781-5.756	0.140
Kidney function	1.241	0.750-2.055	0.400
CKD	7.361	0.884-61.328	0.065
Hematuria	.544	0.152-1.948	0.350
Step 5			
Age	2.107	0.776-5.722	0.144
CKD	14.569	3.367-63.037	0.000
Hematuria	.449	0.132-1.530	0.200
Step 6			
Age	2.065	0.761-5.606	0.155
CKD	12.533	2.925-53.708	0.001
Step 7			
CKD	12.712	2.968-54.449	0.001†

† significant

* test analysis of non-proportional hazard

DISCUSSION

This study shows no significant difference between kidney function in nephrostomy and DJ stent postoperatively. Some study shows the same result [2,3]. Meanwhile, Shoshany et al. (2015) found that renal function improvement was better after Double-J stent than percutaneous nephrostomy. In their study, eGFR after DJ Stent insertion and nephrostomy is 85.5 (69.3-90.6) MDRD, mL/min/1.73 m² vs. 69 (58.1-80.4) MDRD, mL/min/1.73 m², a p-value of 0.001. This difference is because patients who undergo nephrostomy have a lower baseline eGFR before the procedure, and renal function tests are carried out over more extended periods [4].

The number of patients with DJ stent visits is higher than that with nephrostomy because of the pain complaints. Ahmad et al. (2013) found the same result where the visit of DJ Stent patients increased due to complaints of postoperative pain. A study from Goldfarb involving 202 cervical cancer patients who underwent stent placement showed as many as 117 patients (58%) underwent >1 stent procedure [1]. The frequency of additional procedures was significantly higher in patients who received radiation as part of treatment. Patients undergoing stent therapy most often experience side effects on the urinary tract. The risk of UTI was 190 patients (per 100 people/year), 67 patients with symptoms of lower urinary tract infection, 42 patients experiencing urinary stones, and six patients with low back pain. This rate is higher than cervical cancer patients who do not undergo stent placement [5].

The incidence of postoperative hematuria in the nephrostomy and DJ Stent groups had no difference. The hematuria in the study of Song also occurred in 70 patients with gynecological problems who had PCN and DJ stent. Still, chances after installing a DJ Stent are 14 % more than after PCN [6]. Johnson's study showed a higher proportion of pyelonephritis in patients undergoing PCN vs. ureteral stent [6]. Acute pyelonephritis occurred in 5.9% of patients who underwent ureteral stent placement and 3.8% of patients who underwent PCN in the Ku et al. study.[7]

The two procedures do not differ in patients' quality of life. The quality of end-stage cervical cancer patients will be better if drainage is carried out. Mashadi et al. (2018) stated that patients who underwent nephrostomy had better survival than patients who did not undergo nephrostomy with p = 0.0470.[8] Ku et al. (2004) that there is no difference in the quality of life in DJ Stent and nephrostomy, but it is known that patients with DJ Stent have better physical function even though they often visit because of pain complaints.

That the pain symptoms in patients undergoing DJ Stent surgery are greater than those with nephrostomy. Ku et al. (2004), also found more pain complaints in DJ Stents with p = 0.0001 compared to nephrostomy. [7]

Van Ardrth et al. study found that 12 out of 17 people (70.6%) in the PCN group died, and as many as five patients (29.4%) reported having a partial response. Meanwhile, in the group that did not receive PCN, 10 (90.9%) of the 11 patients died, and only 1 (9.1%) had a partial response to treatment.[13] The Serbian study indicated that the survival time for patients with ureteral obstruction and normal renal function was 16 months, 12 months for patients with improved renal function after PCN, and five months for patients with persistently elevated creatinine levels.[9]

The five years survival rate and the overall stage of cervical cancer is 72%. Prognosis in cancer that has metastasized to other organs must have a worse prognosis because treatment of local lesions is better than systemic treatment such as chemotherapy. With treatment, 80-90% of women with stage I cancer and 50%-65% of those with stage II cancer are still alive five years after diagnosis. Approximately 25%-35% of women with stage III cancer and 15% or more with stage IV cancer are viable after five years.[10]

The nasty complications of advanced cervical cancer with obstructive uropathy are hydronephrosis and uremia. Percutaneous nephrostomy can correct uremia, but the prognosis and outcome of the primary disease are not affected, and the patient is forced to undergo all complications of end-stage cancer. [10]

There was a significant difference in the group of patients who underwent PCN, the risk of death in advanced cervical cancer with an impaired renal function who underwent conservative intervention or did not undergo PCN was 1.78 times greater than that of patients who underwent PCN. Harrington et al. stated survival of patients with ureteral obstruction caused by malignancy were 133 days [11]. A total of 17 patients survived (40%) at six months and 5 (12%) at one year.[16] According to Romero et al., the mean survival rate after PCN in patients with cervical cancer was 49.2% at six months and 36.9% at 12 months [12].

The result of non-proportional hazard Cox regression is to determine the factors that affect survival. This research can be objectively seen from the laboratory results of kidney function. The subjects in this study have been explained the procedures for filling out the questionnaire so that filling out the questionnaire is more accurate and

using instruments that have been tested for reliability and validity in Indonesia with good results. The weakness of this study is that it uses subjects in specific populations and is carried out in certain places, so the results of this study cannot describe the same conditions in different populations and areas.

CONCLUSION

The two procedures had similar postoperative kidney function, quality of life, and overall survival. Percutaneous nephrostomy is superior to DJ stent insertion in terms of procedure-related complications. However, we should recommend an individualized approach to the most appropriate palliative care procedure.

CONFLICT OF INTEREST

The author declares that there is no conflict of interest related to the publication of this research article.

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ETHICS IN RESEARCH

This research has received approval from the research ethics commission of the Prof. Dr. I.G.N.G Ngoerah Hospital/ University of Udayana with No. 1484/UN 14.2.2VII.14/LT/2021 and all of the respondents in this study had obtained informed consent and signed the sheet regarding their participation in this study prior to data collection.

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