

## CHARACTERISTICS OF OBSTRUCTIVE ANURIA PATIENTS IN A TERTIARY HOSPITAL IN EAST JAVA, INDONESIA

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### ABSTRACT

Obstructive uropathy is an obstruction of urinary passage which may lead to anuria, a condition where urine production is less than 50 to 100 ml in 24 hours. The varying etiologies and underlying pathophysiology among different cases based on different demographics can make it difficult for physicians to decide the proper management. Therefore, we aimed to evaluate the clinical profile and management of anuria patients in Dr. Soetomo General Academic Hospital over a four-year period. This was a descriptive study with a retrospective approach evaluating all patients with anuria admitted from January 2016 to December 2019. Patient data taken from the medical record were presented descriptively. A total of 176 patients were obtained. Only 161 patients were included. Most of the patients were female (n=100, 62.11%) aged 51 to 60 years old (n=63, 39.1%). Postrenal obstruction due to urinary stone was the most frequent etiology (n=86, 53.4%). Consequently, some patients developed hydronephrosis, which was mostly dominated by the bilateral (n=130, 80.8%) and severe types (n=75, 46.6%). A total of 129 patients (80.1%) underwent hemodialysis. Most of the patients were treated with definitive treatment (n=46, 38.7%). Normalization of renal function mostly occurred in patients who underwent percutaneous nephrostomy (PNS) before giving a definitive treatment.

**Keywords:** Obstructive anuria; obstructive uropathy; obstructive anuria management; human & disease

### ABSTRAK

Uropati obstruktif merupakan suatu proses obstruksi dari pasase urin yang dapat menyebabkan anuria, suatu kondisi dimana produksi urin kurang dari 50 sampai 100 ml dalam 24 jam. Etiologi dan patofisiologi yang berbeda-beda antar tiap kasus dapat membuat seorang dokter kesulitan untuk menentukan penanganan yang tepat. Oleh karena itu, penelitian ini bertujuan untuk mengevaluasi profil klinis dan tatalaksana pasien anuria di RSUD Dr. Soetomo selama empat tahun. Penelitian ini merupakan penelitian deskriptif dengan pendekatan retrospektif yang mengevaluasi seluruh pasien anuria yang dirawat sejak Januari 2016 hingga Desember 2019. Data pasien yang diambil dari rekam medis disajikan secara deskriptif. Dari total 176 pasien yang diperoleh, sebagian besar pasien adalah perempuan (n = 100, 62,11%) berusia 51 sampai 60 tahun (n = 63, 39,1%). Obstruksi postrenal akibat batu saluran kemih merupakan penyebab tersering (n = 86, 53,4%). Akibatnya, beberapa pasien berkembang menjadi hidronefrosis, yang didominasi oleh tipe bilateral (n = 130, 80,8%) dan tipe berat (n = 75, 46,6%). Sebanyak 129 pasien (80,1%) menjalani hemodialisis. Sebagian besar pasien dirawat dengan pengobatan definitif (n = 46, 38,7%), sayangnya, 42 pasien meninggal sebelum menerima pengobatan definitif (26,1%). Normalisasi fungsi ginjal banyak terjadi pada pasien yang menjalani perkutaneous nephrostomy (PNS) sebelum diberikan pengobatan definitif.

**Kata kunci:** Anuria obstruktif; uropati obstruktif; manajemen anuria obstruktif; human & disease

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## INTRODUCTION

Obstructive uropathy is an obstruction of urinary passage due to an anatomical or structural problem (Khalil 2017). The obstruction may originate proximally in the renal calyces or distally in the urethra. In a condition where a restriction of normal urinary may flow, back pressure of urine into the collecting system may occur. This leads to dilatation of the tract. As the filtration system in the kidneys becomes affected, the development of obstructive nephropathy occurs (Mourmouris et al 2014). It may affect all age groups; however, most cases are present in infants and the elderlies (Chávez-Iñiguez et al 2020). At times, the condition may lead to anuria (Mourmouris et al 2014).

Anuria is a condition where urine production is less than 50-100 ml/24 hours (Kabbani 2014). In developing countries, uropathy obstruction constitutes a major cause for surgical acute kidney injury (AKI) due to several diseases, such as: cervical cancer, urinary stone, bladder cancer, urinary tract stenosis, and iatrogenic causes (Vikrant et al 2018). Developing countries have often struggled with lack of reliable census data, but the physicians still required to know the capability and limitation of each tool for diagnostic to increase the accuracy of the diagnosis made (Wein et al 2020). However, obstructive uropathy management varies between each case. The treatment of choice of anuria is based on each patient's condition (Linton & Hall 2013).

The varying underlying etiologies and pathophysiology requiring prompt diagnosis and urgent care often make it difficult for physicians to decide a proper management (Rakototiana et al 2011). Moreover, different demographics contribute to the variety of the disorder. A proper understanding of the regional characteristics of the obstructive anuria would help physicians to properly recognize and manage the problem it also provides data to contribute to other research. We evaluated the clinical profile and management of anuria patients in Dr. Soetomo General Academic Hospital over a four-year period.

## MATERIALS AND METHODS

This was a descriptive study with a retrospective approach. The research variables were collected at the same time in one sampling period. The center of research and development at Dr. Soetomo General

Academic Hospital, under the ethical committee approved this study proposal. This study was carried out in the Central Medical Record Unit of Dr. Soetomo General Academic Hospital, Surabaya, East Java, whereas the sample in this study was the medical record of patients with anuria who came to Emergency Unit of Dr. Soetomo General Academic Hospital during January 2016 to December 2019. The sampling technique was total sampling. Data collection was carried out by tracking the urology shift report book, and completing the data taken from the patient's inpatient status, as well as the electronic medical record at the hospital.

The data collected were patient demographics, length of time the patient's experience in anuria, causes of anuria, length of hospital treatment, causes of anuria, duration of anuria, treatment taken on hemodialysis patients or not, definitive treatment related to anuria, and existing comorbidities. The inclusion criteria of this study included all adult patients diagnosed with anuria due to post-renal etiologies. Patients with other pre-renal or renal causes of anuria were excluded. Incomplete medical record data was also the reason of exclusion. All data were analyzed and presented descriptively in tables and narration. All statistical analyses were performed using IBM SPSS 24.0. This study was approved by the ethical committee of Dr. Soetomo General Academic Hospital with a decree No. 1983/KEPK/V/2020.

## RESULTS

Based on the medical record data from 2016 to 2019, there were 161 patients with anuria experienced medical treatment at Dr. Soetomo General Academic Hospital. Patients with anuria consisted of 100 women (62.2%) and 61 men (37.8%), and mostly within the 51-60 years old group with 63 patients (39.1%), as well as followed by 43 patients aged 41-50 years (26.7%). The disorder was mostly caused by urolithiasis (53.4%), such as kidney stone or ureteral stone. Other was caused by malignancy (41.6%).

Figure 2. Extra-cardiac comorbid diseases in patients with Tetralogy of Fallot

Table 1. Characteristics of obstructive anuria patients from 2016-2019

	Number of Cases (n)	Percentage of Cases (%)
Age		
< 10	3	1.9
10 – 20	2	1.2
21 – 30	9	5.6
31 – 40	16	10.0
41 – 50	43	26.7
51 – 60	63	39.1
> 60	25	15.5
Sex		
Male	61	37.8
Female	100	62.2
Etiology		
Urolithiasis	86	53.4
Malignancy	67	41.6
Iatrogenic	8	5.0
Comorbidities		
Diabetes Mellitus	26	16.1
Hypertension	71	44.1
No Comorbidities	64	39.8
Hydronephrosis		
Unilateral	31	19.2
Bilateral	130	80.8
Severity		
Mild	28	17.4
Moderate	58	36.0
Severe	75	46.6
Hemodialysis		
Yes	129	80.1
No	32	19.9
Intervention		
PNS	37	32.0
DJ Stent	36	30.3
Definitive Intervention	46	38.7
Average Length of Stay (days)		
Urolithiasis	18.3	
Malignancy	14.09	
Iatrogenic	16.75	
Mortality Rate		
Died	42	26.1
Survived	119	73.9

In Table 2, the etiologies were described into more details. Obstructive anuria due to urinary stone were mostly patients with solitary kidney stone with co-existing contralateral ureteral stone (11.8%), while the malignancies were mostly caused by cervical cancer

(31.1%). In addition, Table 1 showed that hydronephrosis occurred mostly in both sides (80.8%), and the severity was dominated by severe hydronephrosis (46.6%).

Table 2. Etiology of obstructive anuria among patients

	Number of Cases (n)	Percentage of Cases (%)
Stone Location (n = 86, 53.4%)		
Bilateral Proximal Ureteral Stone	12	7.5
Bilateral Distal Ureteral Stone	15	9.3
Bilateral Proximal and Distal Ureteral Stone	9	5.6
Bilateral Renal Pelvic Stone	2	1.2
Renal Pelvic and Staghorn Stone	3	1.9
Renal Pelvic and Ureteral Stone	9	5.6
Staghorn and Ureteral Stone	7	4.3
Unilateral Kidney and Ureteral Stone	19	11.8
Unilateral Kidney and Renal Pelvic Stone	8	5.0
Unilateral Kidney and Staghorn Stone	2	1.2

Malignancy (n = 67, 41.6%)		
Cervical Cancer	50	31.1
Testicular Cancer	5	3.1
Ovarian Cancer	4	2.5
Bladder Cancer	2	1.2
Prostate Cancer	2	1.2
Endometrial Cancer	2	1.2
Rectal Cancer	1	0.6
Non-Hodgkin's Lymphoma	1	0.6
Iatrogenic (n=8, 5%)		
	8	5.0

Most patients had hemodialysis treatment before treated surgically (80.1%), with the average of hemodialysis treatment were 3 times before the procedure. The treatment of choice was mostly definitive therapy with 46 patients (38.7%), consisting of 43 patients with urolithiasis and 3 patients with iatrogenic causes. The second most common procedure performed was installation of PNS in 37 patients (32%), consisting of 22 malignancy patients and 15 urolithiasis patients. The third most common procedure was DJ stent placement in 36 patients (29.4%) comprising mostly of malignancy patients. The longest average length of stay (LOS) was found in patients

with urolithiasis, where the LOS was 18.3 days followed by iatrogenic as a cause, so that the LOS was 16.75 days. The level of blood urea nitrogen (BUN) and creatinine serum (Cr) were evaluated in each patient to evaluate the outcome of the procedure.

The PNS could reduce the level of BUN and Cr most significantly (42.59 and 12.74 respectively), followed by definitive therapy with an average reduction of 38.39 and 9.23 respectively, whereas DJ stent could reduce level of BUN and Cr with an average of 30.9 and 6.37 respectively.

Table 3. Kidney function change among obstructive anuria patients before and after treatment

Intervention	Parameter	Pre-Intervention	Post-Intervention	Mean Decrease
Definitive	BUN (mg/dL)	75.52	37,13	38,39
	Cr (mg/dL)	13,00	3,76	9,23
PNS	BUN (mg/dL)	87.67	45,08	42,59
	Cr (mg/dL)	16.90	4,15	12,74
DJ Stent	BUN (mg/dL)	78.38	47,47	30,90
	Cr (mg/dL)	12.80	8,42	6,37

**DISCUSSION**

In this study, we discovered that a proper management of obstructive anuria resulted in a low mortality rate as well as restoration of renal function in most patients. From the total of 161 anuria patients, there were 100 female patients (62.2%) and 61 male patients (37.8%). This demographic data was quite unusual compared to some previous studies. Choi et al (2015) showed that the majority of anuria patients with acute kidney injury (AKI) were male with a percentage of 62.8%. Other studies that confirmed male dominance in obstructive anuria cases of anuria was Khalil et al (2017), stated that the ratio of men to women was 1.3 in cases of obstructive anuria, and it was caused by both malignancy and urinary stones. The prevalent age group in this study was in accordance with the study by Choi et al (2015), that anuria patients had an average age of 59.4 ± 19.9 years. However, the report in the study

mostly discussed anuria caused by pre-renal, renal and post renal etiologies.

Another study also stated that comorbidities, such as diabetes (26.7%) and hypertension (37.5%) were common in AKI patients with anuria. It explained that patients with AKI who had shared-several risk factors, such as obesity, metabolic syndrome, diabetes, hypertension, cardiovascular disease, and microalbuminuria, were more prone to CKD development and anuria progression (Jung et al 2016). In this study, most patients were suffering from diabetes and hypertension. The findings regarding the main etiology for obstructive anuria in this study were in line with the study by Jeevagan et al (2013), that most patients with obstructive anuria were associated with urolithiasis.

Throughout the years, this etiology seems consistent. However, a retrospective two studies collecting 44

patients for 4 years in 2 urology centers in Eastern Morocco showed mixed results. The study showed that obstructive anuria was mostly caused by malignancy in 28 cases, and 16 cases with urinary stones (Khalil 2017). The solitary kidney stone with co-existing contralateral ureteral stone found in majority of patients in this study was possibly associated with the comorbidities among the patients. Urolithiasis in this study was mostly caused by ureteral stones. This was in line with a study in Japan which claimed that 73.3% of urolithiasis located in the ureter (Yamamoto et al 2012). The second most common etiology of the patients was malignancy which was dominated by cervical cancer (74.6%).

The most common complication of anuria is hydronephrosis. Immediate decompression is often required to prevent further complications in infected hydronephrosis due to renal obstruction, either unilateral or bilateral (Türk et al 2020). In this study, most patients had severe hydronephrosis, occurring in 75 patients (46.6%). Before undergoing further treatment, 129 patients had undergone hemodialysis (80.1%). Anuria is prognostic and a sign of poor hemoperfusion, hemodialysis or peritoneal dialysis are often required. This finding was in line with a study by Lutaif et al (), that the need for hemodialysis before nephrostomy in uropathy obstruction due to cervical cancer was approximately 40% to 42% of all patients.

The definitive treatment and PNS were performed in 46 patients (38.7%) and 37 patients (32%) respectively as the most prevalent treatment. Previous studies commonly used PNS for temporary diversion before definitive treatment. This difference was due to urolithiasis being the most prevalent etiology encountered in the patients, where PNS was chosen as the definitive management (ElSheemy et al 2014). The guideline for obstructive uropathy due to malignancy is still controversial, and there is yet to be a specific guideline. Urinary diversion is based on the availability of procedures, operator skill, emergency considerations, and patient's preference. PNS is the procedures of choice when transurethral access is not possible for cases with obstruction due to extrinsic mass (Hsu et al 2016).

The interventions performed were mostly successful to reduce BUN and Cr levels. PNS had the highest average of BUN and Cr reduction (45.59 and 12.74 mg/dL respectively). Proper management heavily influences outcome, including BUN and Cr levels. Elsheemy et al (2014) and Abdel-Kader (2011) claimed that proper definitive management based on the etiology of the disorder could reduce the average Cr from 4.59 mg/dL

to 0.44 mg/dL. There were 42 patients who did not survive during the course of care (26.1%).

The mortality rate is considerably low compared to the mortality rate of obstructive anuria patients in the single-center study by Choi et al (2015), where the mortality rate was 44.8% with 18.7% surviving patients becoming hemodialysis dependent. The findings of this study provided important data for obstructive anuria patients' characteristics and their management. However, this study was limited by its retrospective design and small population range. Future studies were recommended to evaluate the association of obstructive anuria patients' characteristics with the management and clinical outcomes associated with the disorder in a much larger population.

## CONCLUSION

The obstructive anuria patients in Dr. Soetomo General Academic Hospital mostly consisted of female patients aged 51 to 60 years with etiology mostly caused by urolithiasis and malignancy. These findings could be a simple consideration to physicians to be more aware of obstructive anuria problems. Thus, the proper management resulted in a low mortality rate as well as restoration of renal function.

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