



Acute Kidney Injury due to Drug Abuse: A Case Series

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ABSTRACT

Drug abuse is very common in Turkey and worldwide, particularly in the population below 25 years of age. One of the important effects of drug abuse is kidney injury that develops by a directly toxic effect or an indirect impact such as rhabdomyolysis. For treatment, hydration is generally sufficient, but sometimes, renal replacement therapy is required. Kidney injury is reversible with close follow-up and treatment over a period of time. Here we aimed to indicate the importance of drug abuse by considering the etiological factors of kidney injury in nine cases.

Keywords: Drug abuse, kidney injury, rhabdomyolysis

INTRODUCTION

The chemical substances that are used for sedative and stimulant effects, cause increasing desire to take them, and cause indications of deprivation when they are not taken are called "drugs"; the most commonly used drugs are illegal drugs (1). Drug addicts often start using drugs with the thought that they can control their use. However, how addiction will develop cannot be predicted; even one use is very risky. The person feels a necessity to take the substance repeatedly after the first use and then increases the frequency and/or amount of use to experience the same drug effect. With this vicious circle, the person gets addicted. The toxic effects of the drug increase with the increase in the amount of drug substance. Globally, in 2009, 2.8% to 4.5% (125–203 million people) of the people in the age group of 15–64 years had used drugs at least once during the past year. Throughout Europe, 13.9% of people using drugs intensifies in the age group of 15–24 years. In Turkey, according to the data of the Turkish Monitoring Center for Drugs and Drug Addiction, the rate of drug use at least once in life is 2.9% in the age group of 15–24 years, 2.8% in the age group of 25–44 years, and 2.3% in the age group of 45–64 years (1, 2).

One of the important consequences of drug use is renal effects. These effects, which occur with rhabdomyolysis or without rhabdomyolysis, may be in the form of interstitial nephritis, acute tubular necrosis, glomerulonephritis, etc. These effects are usually seen in the form of acute renal damage (3, 4).

CASE REPORTS

Our case series included nine patients (all males; age range, 16–35 years) with the history of narcotic drug use and who had suffered kidney damage.

According to KDIGO criteria, acute renal damage (ARD) is defined as 50% increase in serum creatinine level within 7 days, as an increase of 0.3 mg/dL (26.5 mmol/L) within 2 days, or as a urine output of <0.5 mL/kg/s (5).

The complaints of patients for which they visited the hospital are summarized in Table 1, and the narcotic and pleasure-inducing substances and forms of their use are summarized in Table 2.

Two patients (22.2%) underwent treatment because they experienced agitation during their follow-ups. One of them had a history of one-time intravenous and anxiolytic drug use. The other patient had a history of long-term use of only oral drugs.

Nausea and/or vomiting were detected in four patients (44.4%), all of whom stated that they used only oral drugs. Three of these four patients (75%) had used drugs more than once. Diarrhea was observed in two patients (22.2%), with accompanying nausea and/or vomiting in both. One of these patients (50%) had used drugs only once, and the other (50%) had used drugs multiple times.

Table 3 summarizes the patients' hemodialysis needs, reasons for undergoing hemodialysis, and the number of hemodialysis sessions performed, and Table 4 summarizes the pathological laboratory parameters of the patients.

Consequences in two patients were unknown because they refused the treatment. The duration of hospitalization was 3–27 days. There was no incidence of exitus among patients who accepted the treatment. The remaining seven patients were discharged with normal clinic and laboratory parameters. Due to the retrospective design of the study, informed consent was not taken.

DISCUSSION

Drug use is becoming a growing issue. Nowadays, in Western societies, almost everybody uses drugs some time in his/her life, and the age at which an individual comes in contact with drugs is gradually decreasing. In addition, drug use can lead to acute and chronic complications. Almost all drugs can lead to similar kidney problems. Renal toxicity may occur in the form of idiosyncrasy or may occur depending on the accumulation of the drug in the body and/or kidney. Because of associated serious morbidities and mortality, renal complications, although not frequent, can lead to clinical conditions that require urgent intervention. The

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Table 1. Clinical complaints of patients at admission

Clinical complaints	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8	Case 9
Agitation	*								*
Nausea/vomiting				*	*		*		*
Diarrhea				*	*				
Mental fog/consciousness	*	*	*			*		*	
Oliguria/anuria					*				*
Edema						*			

Table 2. Narcotic and pleasure-inducing substances and forms of their use

Substance that is used	Heroin	Bonsai	Anxiolytic	Alcohol	Multi-use	Method of use
Case 1	*		*			IV, oral
Case 2	*				*	IV
Case 3	*	*			*	IV, oral
Case 4		*			*	Oral
Case 5		*				Oral
Case 6	*				*	IV
Case 7		*			*	Oral
Case 8		*		*		Oral
Case 9		*			*	Oral

IV: intravenous

Table 3. Patients' hemodialysis needs, reasons for undergoing hemodialysis, the number of hemodialysis sessions, and hemodialysis complications

	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8	Case 9
Need for hemodialysis			*	*		*		*	
Reason for undergoing hemodialysis			MA	Uremia		HV		HV	
Duration of hemodialysis (session)			0	1		10		5	
Denying the treatment			*	*					
Hemodialysis complication			AR			CI		HT	

MA: metabolic acidosis; HV: hypervolemia; CI: catheter infection; HT: hypotension; AR: allergic reaction

risk of nephrotoxicity increases in the conditions of additional nephrotoxic substance intake, dehydration, intravenous drug use, poor living, and adverse posture (6).

Although the mechanism of action of drugs on the kidneys has not been completely determined, direct toxic effects, dehydration due to vomiting, abdominal pain, rhabdomyolysis, elevated serum uric acid levels, and oxidative stress factors are involved in the etiology of nephrotoxicity (6-9). Infections, such as HCV and HIV infections, which can occur in intravenous drug users, can demonstrate similar histological findings and cause possible toxic effects on the kidneys, leading to renal diseases (10).

The symptoms of patients are usually non-specific, and impaired consciousness ranging from mild or no impairment to deep coma can be observed. Symptoms, such as unconsciousness, nausea/vomiting, tachycardia, and fear of death, which cannot be associated with a specific cause, are common. During the laboratory examinations and anamnesis taken during the general assessment performed at the health center that the patients visit for their complaints, the diagnosis is made using renal function tests and muscle enzyme tests and also based on the patient's or his/her relatives' declaration that the patient uses drugs. Importantly, that the doctor examining the patient should be suspicious and

Table 4. Pathological laboratory parameters of patients

		Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8	Case 9
Glucose (mg/dL)	Hospitalization	350.00	162.00	112.00	83.00	97.00	123.00	93.00	104.00	98.00
	Discharge	192.00	61.00		108.00	89.00	102.00	78.00	113.00	79.00
Urea (mg/dL)	Hospitalization	44.90	83.50	120.00	86.00	124.10	87.70	40.70	85.60	70.60
	Discharge	42.80	27.80		65.00	79.20	51.40	38.50	102.10	21.60
Creatinine (mg/dL)	Hospitalization	1.40	2.87	10.50	10.40	3.24	4.07	2.73	3.77	3.27
	Discharge	0.64	0.90		7.60	1.54	1.35	1.31	1.58	1.31
GFR (mL/min/1,73m ²)	Hospitalization	70.00	30.00	6.00	6.00	27.00	19.00	31.00	21.00	26.00
	Discharge	137.00	12.00		9.00	66.00	70.00	75.00	60.00	79.00
AST (U/L)	Hospitalization	200.00	1693.00	9.00	14.00	62.00	4797.00	39,00	3325.00	69.00
	Discharge	154.00	245.00		11.00	40.00	55.00	6,00	46.00	59.00
ALT (U/L)	Hospitalization	64.00	5082.00	6.00	15.00	34.00	816.00	30,00	660.00	48.00
	Discharge	93.00	1030.00		17.00	34.00	86.00	22,00	91.00	39.00
Sodium (mmol/L)	Hospitalization	139.00	146.00	145.00	132.00	121.00	125.00	139,00	143.00	139.00
	Discharge	150.00	140.00		140.00	137.00	138.00	143,00	138.00	143.00
Potassium (mmol/L)	Hospitalization	4.30	8.10	5.65	4.04	4.60	6.20	4,30	6.20	4.20
	Discharge	3.80	4.30		3.68	4.20	4.70	4,30	4.20	4.60
Calcium (mg/dL)	Hospitalization	9.23	7.67	6.90	7.70	10.10	8.52	9,69	8.88	9.93
	Discharge	9.68	8.32		7.70	9.90	10.00	9,10	9.51	8.76
Phosphorus (mg/dL)	Hospitalization	1.79	3.99	8.10	3.60	6,05	7.57	5,20	5.25	5.70
	Discharge	2.97	2.97		4.60	2.89	3.47	4,77	5.21	3.78
Creatine kinase (U/L)	Hospitalization	7090.00	24000.00	510.00	220.00	603.00	50581.00	1450,00	9037.00	1063.00
	Discharge	2664.00	1859.00		180.00	385.00	69.00	96,00	286.00	676.00
Hemoglobin (g/dL)	Hospitalization	13.60	14.90	9.75	10.80	17.00	18.60	14,50	14.20	13.70
	Discharge	12.70	12.90		11.50	16.20	12.00	13,00	9.70	11.10
CRP (mg/dL)	Hospitalization	186.70	146.65	6.98	36.13	185,28	121.07	30,10	28.43	26.07
	Discharge	105.78	96.81		13.48	110.30	18.29	2,54	3.05	19.24
Uric acid (mg/dL)	Hospitalization	5.20	12.40	8.80	6.20	12.60	13.10	6,20	20.70	9.00
	Discharge	2.30	12.80		5.70	7.70	3.30	6,10	5.40	6.70

GFR: xxx; AST: xxxx; ALT: xxx; CRP: xxxx

should particularly question the patient or his/her relatives about drug use (9). Most cases are clinically diagnosed, and kidney biopsy is rarely necessary (6).

After the diagnosis of kidney damage, treatment should be immediately started. Early diagnosis and early treatment may be lifesaving in patients who require immunosuppression and/or have indications for renal replacement therapy. Eliminating the cause is a priority. Treatment is usually symptomatic and supportive. However, immunosuppressants, including corticosteroids, may occasionally be required (8, 11). Sufficient hydration is important because of dehydration and the occlusive effect of myoglobinuria in rhabdomyolysis. Urinary alkalization can be useful

in selected cases. Occasionally, renal replacement therapy may also be necessary in the case of developing oliguria or when no response to treatment for dehydration is observed. Hemodialysis, peritoneal dialysis, hemoperfusion, or hemofiltration can be performed according to the clinical condition of the patient and according to the conditions of the center. Although it is controversial as to which modalities are more effective, it is believed that no significant difference exists among the modalities (12). Four of our patients needed hemodialysis.

CONCLUSION

The rapidly increasing use of drugs in our country in recent years has led to destructive consequences. Drug use-related renal in-

sufficiency that was rarely encountered in the past is now being frequently observed. Serious efforts are required against drug use that causes serious consequences in terms of both social and personal health, and more attention should be paid to ARD that develops due to drug use.

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