Frequency and clinical evolution of acute renal failure in obstetric patients treated in the Intensive Care Unit of a high-specialty hospital in Mexico City☆

Frecuencia y evolución clínica de la insuficiencia renal aguda en pacientes obstétricas tratadas en la unidad de cuidados intensivos de un hospital de alta especialidad en la ciudad de México

Acute renal failure (ARF) is a syndrome defined by sudden impairment of filtration and an increase of nitrogenated compounds in blood with or without decreased urinary output. In Mexico, its prevalence is 79.7 per cent in pregnant women with high-risk factors,[1] and 75 per cent in pre-eclamptic patients hospitalized in intensive care units (ICU).[2]

Critically ill obstetric patients are especially susceptible to develop ARF. Both the clinical manifestations and the complications are related to renal failure and fetoplacental repercussion.[3] Early diagnosis and timely treatment solve the problem in most patients except for when severity is extreme which is when admission in the ICU is recommended.[4] When required, early hemodialysis to reduce complications and serious sequelae should be initiated.[5] The goal of this research was to determine the frequency and clinical progression of ARF in obstetric patients treated in the ICU of a high-specialty hospital in the City of Mexico.

1305 medical records of women admitted at the ICU of the High-Specialty Medical Unit of the Hospital of Gynecology and Obstetrics #3 of the ''La Raza'' National Medical Centre at the Mexican Institute of Social Security were reviewed between January 1, 2012 and June 30, 2014. Pregnant patients or patients in the puerperium phase with ARF defined as the acute impairment (<48 h) of filtration based on the following Acute Kidney Injury Network (AKIN) criteria were included: (a) increase of serum creatinine (Cr) levels $\geq$0.3 mg/dl; (b) increase of serum Cr levels $\geq$50 per cent (1.5 times above the basal level) and (c) uresis <0.5 ml/K/h during a $\leq$6 h period of time.[6] Patients with chronic nephropathy, peritoneal dialysis, hemodialysis or carriers of renal grafts were excluded. No cases were precluded because all medical records and lab reports were complete and fully available.

The frequency of obstetric patients with ARF in relation to the total number of admissions was estimated. Three (3) measurements of the serum Cr levels and glomerular filtration rate were taken: at the moment of ICU admission, during the ARF nadir and at ICU discharge. The volume of total uresis in intensive care was studied as well. In order to estimate the glomerular filtration rate, the levels of creatinine clearance (CrCl) were estimated using the Cockroft-Gault equation (CrCl ml/min/1.73 square meters of body surface = [(140 − age) × weight (kg)/serum Cr levels (mg/dl) × 72] (0.85 for being a female) (1.73 body surface [square meters]/body surface [square meters]). Clinical progression included: arterial hypotension (systolic pressure <90 mmHg), surgical reinterventions, hemodialysis, outcomes, mortality and stay at the ICU. The study was authorized by the local committee of investigations (CLIS 2013-3504-29). For the statistical analysis, descriptive and inferential statistic methods (Student *t* test) were used. *P* values <0.05 were considered significant values.

Table 1 General data.

Data	Values
Number of patients	63 cases
AKIN classification	
Stage 1	71.43 per cent (45 cases)
Stage 2	19.05 per cent (12 cases)
Stage 3	9.52 per cent (6 cases)
Maternal age (years)	30.85 ± 7.17
Range	17–44
Parity (median)	2
Range	1–4
Gestational state	
With pregnancy	49.20 per cent (31 cases)
Surgical puerperium	38.10 per cent (24 cases)
Physiological puerperium	12.7 per cent (8 cases)
Gestational interruption	
C-section	84.13 per cent (53 cases)
Vaginal delivery	15.87 per cent (10 cases)
Obstetric bleeding (ml)	49.20 per cent (31 cases)
Average	1103.44 ± 130.25
Range	100–6200
Surgical reinterventions	
One	11.11 per cent (7 cases)
Two	4.76 per cent (3 cases)

AKIN: Acute Kidney Injury Network.[6]

Sixty-three obstetric patients with ARF were identified—some 4.82 per cent of all ICU admissions whose general data are shown in Table 1. There were no losses of patients due to lack of data in the files, or any biases for this reason. The causes for ARF were: severe preeclampsia 65.07 per cent (41 cases), eclampsia 6.34 per cent (4 cases), obstetric hemorrhage with hypovolemic shock 4.76 per cent (3 cases), sepsis 4.76 per cent (3 cases) and various diagnoses 19.07 per cent (12 cases).

ARF was diagnosed at admission in 85.71 per cent (54 cases) and in the ICU in 14.29 per cent (9 cases). Based on the AKIN criteria,[6] distributions were: stage 1, 71.43 per cent (45 cases); stage 2, 19.05 per cent (12 cases) and stage 3, 9.52 per cent (6 cases). The serum Cr levels

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Table 2 Changes of renal function.

Parameters	Measurements			*P* value	
	ICU admission	ARF nadir	ICU discharge		
Serum creatinine (mg/dl)	1.59 ± 0.99	1.67 ± 0.77	1 ± 0.61	Admission vs discharge	0.09
				Admission vs nadir	0.06
				Nadir vs discharge	0.03
CrCl	54.36 ± 29.81	43.55 ± 14.13	87.60 ± 37.07	Admission vs discharge	0.16
				Admission vs nadir	0.09
				Nadir vs discharge	0.01
Uresis (ml/K/h)		1.61 ± 1.21		–	–

CrCl: creatinine clearance (ml/min/1.73 square meters of body surface) corrected using the Cockroft-Gault equation; ARF: acute renal failure; ICU: intensive car unit.

at ICU admission were 1.59 ± 0.99 mg/dl (range: 0.7–6), the ARF nadir was 1.67 ± 0.77 mg/dl (range: 1.8–6.4), and the Cr levels at ICU discharge were 1 ± 0.61 mg/dl (range: 0.4–3.9). The CrCl levels at ICU admission were 54.36 ± 29.81 (range: 8.87–95.04), the ARF nadir was 43.55 ± 14.13 (range: 9.95–85.73), and the CrCl levels at ICU discharge were 87.60 ± 37.07 ml/min/1.73 m^2 of body surface (range: 14.14–124.3) (Table 2). The mean of total volume of uresis was 1.61 ± 1.21 ml/kg/h (range: 0–5.7).

Arterial hypotension was diagnosed in 1.58 per cent (1 case), surgical reinterventions on one (1) occasion, in 11.11 per cent (7 cases), and on two (2) occasions in 4.76 per cent (3 cases), and hemodialysis in 1.58 per cent (1 case). These were the outcomes: referrals to the general ward of patients with ARF recovery in 95.26 per cent (60 cases), referrals to an infectology hospital for the management of sepsis with ARF but without hemodialysis in 1.58 per cent (1 case), referrals to the hemodialysis unit in 1.58 per cent (1 case), and mortality due to hemorrhage with ARF in 1.58 per cent (1 case). Thus, at ICU discharge, ARF progressed satisfactorily in 95.26 per cent (60 cases) and in 4.76 per cent (3 cases) the AKIN-stage 3 was maintained. Stays at the ICU were 4.30 ± 3.72 days (range: 1–19).

In the actual investigation, the critically ill obstetric patients with ARF were 4.82 per cent – lower numbers than in previous reports in Mexico.[1,2] Guerrero et al.[7] studied 333 women managed in the ICU, among which 86.18 per cent (287 cases) were pregnant women whose main causes for ARF were similar: preeclampsia, eclampsia, hemorrhage, and sepsis. Findings are consistent with the studies conducted in industrialized countries[3] and in developing countries like India,[8] Morocco[9] and Saudi Arabia.[10] Arterial hypotension was scarce even though some patients underwent reinterventions one or more times. The ARF was not seriously possible because they were young women with an intact pregestational condition, and possibly because they were identified early. Following the indications of hemodialysis and pregnancy,[5] the method was implemented in 1.58 per cent (1 case) only. Mortality rates were low (1.58 per cent), and similar to the 1.74 per cent reported by Guerrero et al.[7] but lower than the 20 per cent reported by Prakash et al.[8] and the 28.3 per cent reported by the study conducted by Bentata et al.[9] and the 12 per cent reported by Aggarwal et al.[10] The ARF in critically ill obstetric patients is a challenge for the multidisciplinary medical team. Intensive care can play a decisive role when trying to achieve successful results.

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Conflicts of interests

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Hydroxychloroquine, a potentially lethal drug☆

La hidroxicloroquina, un fármaco potencialmente letal

Dear Editor,

Although hydroxychloroquine is widely used in Spain, mainly in application to rheumatological disorders, very few cases of intoxication caused by this drug have been reported to date. The present clinical case describes the basic characteristics of hydroxychloroquine intoxication, and provides a review of the guidelines for using the drug.

A 29-year-old woman presented with a history of one normal pregnancy and no known allergies or substance abuse. She was undergoing follow-up in another center due to non-specified connective tissue disease, and had not received treatment for months.

The out-hospital emergency service was alerted from the home. The patient had been asymptomatic when a relative heard her fall to the floor. She was found to be unconscious, without abnormal movements. Upon arrival of the ambulance, the patient presented a Glasgow coma score of 3, with anisocoria (left-eye mydriasis) and a blood pressure of 40/28 mmHg. Orotracheal intubation was performed in the home, with volume replacement measures. She presented sudden ventricular tachycardia (VT) requiring 6 min of advanced cardiopulmonary resuscitation (CPR) maneuvering to resolve the situation. The patient subsequently suffered cardiorespiratory arrest in VT rhythm during 5 min, receiving a total of three defibrillations and 5 mg of adrenalin.

Upon arrival in the emergency service, the patient presented low level of consciousness but was able to mobilize all four extremities without apparent paresis. The mentioned anisocoria was confirmed, with bilaterally responsive pupils. She was initially hemodynamically stable, though with rapid progression to hypotension requiring the start of vasoactive support with noradrenalin. The initial electrocardiogram (ECG) revealed sinus rhythm at 75 bpm, with no other alterations. The laboratory tests showed plasma potassium 1.5 mEq/l, pH 7.01, lactic acid 11 mmol/l and bicarbonate 12 mEq/l. The brain computed axial tomographic (CAT) findings were normal, and thoracic angioCAT for the evaluation of other possible causes of cardiac arrest discarded the presence of pulmonary thromboembolism.

During the first hours of admission to the Intensive Care Unit (ICU), hypopotassemia was seen to persist despite intravenous corrective measures. Eight hours after admission the patient developed self-limiting bursts of polymorphic/monomorphic and *torsades de pointes* type VT, with prolongation of the QT interval on the basal ECG tracing between bursts. The condition subsequently evolved toward sustained VT requiring repeat electrical shock and the start of isoproterenol infusion–followed by shortening of the QT interval and disappearance of the ventricular arrhythmias.

The initial case history compiled from information supplied by the relatives was unremarkable. The patient was receiving no medication on a regular basis and had not consumed toxic substances in the last few hours, though she was described as having emotional problems.

Following the difficult diagnostic orientation at the start, given the incomplete anamnesis in the context of the situation, we suspected a possible toxic origin–in this case represented by hydroxychloroquine, which the patient had been prescribed months ago for her connective tissue disease. A review of the literature confirmed that her symptoms were consistent with hydroxychloroquine intoxication. Since there were limitations in confirming the diagnosis due to the lack of available serum drug levels determined by the laboratory, we asked the relatives to conduct a search in the home, which yielded several empty blister strips of the medication. This supported our initial suspicion: the patient had consumed 42 tablets of 200 mg of hydroxychloroquine each, in the context of attempted suicide.

After the first 48 h, protocolized extubation could be performed, with a good clinical course, no neurological defects, and no further cardiovascular alterations. The patient admitted having attempted suicide, and subsequent psychiatric care was indicated. It should be mentioned that at the time when hydroxychloroquine intoxication

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