The star fruit as a cause of acute kidney injury☆

La fruta estrella causa fracaso renal agudo

Dear Editor,

Star fruit, or carambola (*Averrhoa carambola*), belongs to the *Oxalidaceae* family, which is shown in Fig. 1. This fruit is commonly consumed in Asia and Latin America, although with globalisation it is easy to find it in any country across the world. Numerous therapeutic properties have been attributed to it, however carambola is rich in oxalic.[1–3] In patients with chronic kidney disease, the consumption of star fruit is associated to neurological symptoms that can range from hiccups and confusion to coma and death.[2,4] Despite their widespread consumption, there are only about ten cases reported of acute kidney injury (AKI) secondary to carambola consumption.[1,2,5–8] Here we present a new case of AKI caused by carambola consumption.

The patient is 55-year-old female from Peru with a personal medical history of smoking, hypertension treated with dietary measures, type II diabetes mellitus controlled with 2 oral antidiabetics, and dyslipidaemia treated with a statin. She went to the emergency room because of low back pain on both sides, with nausea, abdominal pain and asthenia. The physical examination showed blood pressure of 140/80 mmHg, mild mucocutaneous dehydration, and pain on palpation of both kidneys areas, with no pain reaction to percussion in both sides. Laboratory test results were: haemoglobin 13.6 g/dl, WBC 8300/μl, serum creatinine 4.55 mg/dl, urea 113 mg/dl, sodium 143 mEq/l, potassium 5.1 mEq/l, pH 7.30, pCO_2 37 mmHg and HCO_3 18 mmol/l. In urine the results were: sodium 36 mEq/l, potassium 31 mEq/l, creatinine 101 mg/dl and proteinuria 20 mg/dl. The urine sediment presented limited bacteriuria, crystals of amorphous urates, 5 WBC and 2 RBC per field. The patient was admitted to the internal medicine service, with an initial diagnosis of possible acute pyelonephritis. However, despite empiric antibiotic therapy with ceftriaxone and intensive serum therapy, renal function did not improve, and so consultation to the nephrology department was requested. Many studies were performed during admission (autoimmunity, viral serology, proteinogram and thyroid profile), with no abnormalities. The ultrasound showed enlarged kidneys (14.8 cm on the right and 14 cm on the left), with no other findings.

Fig. 1 – Image of *Averrhoa carambola*.

On a second interrogation, the patient admitted to have felt confusion, awkwardness, dizziness, low back pain, abdominal pain and nausea 2 h after a large intake of 2–3 glasses of "carambola" juice, while the patient was fasting. Reviewing the literature, the renal and neurological clinical symptoms were consistent with a large intake of this fruit. Treatment with urine alkalinisation was intensified and combined with intakes of magnesium and potassium citrate. After these measures, the patient had polyuria without the need for haemodialysis, and renal function gradually improved to a serum creatinine level of 1.4 mg/dl after 3 weeks. Due to the clinical history and the progressive recovery of renal function, no kidney biopsy was performed.

Star fruit (*Averrhoa carambola*) is regularly consumed in Latin America and Asia. It is often consumed in tropical countries, where numerous cases of neuronal toxicity in patients with chronic kidney disease have been reported.[2,4] In 2001, the first 2 cases of AKI due to carambola consumption were published,[1] and, since then, a total of 10 cases have been reported (see Table 1).[1,2,5–8] In addition, there are other fruits in the *Averrhoa* genus, such as *Averrhoa bilimbi*, that can cause AKI due to oxalic deposits.[9] The mechanism by which oxalic acid causes AKI is twofold: first, it is obstructive due to calcium oxalate lithiasis, and second, because oxalate causes apoptosis of tubular epithelial cells.[10] The treatments used are non-specific: low doses of steroids, hydration and haemodialysis, after which all patients normalised the renal function. In summary, carambola consumption should be investigated in all patients with unexplained AKI or the presence of oxalic acid deposits in the kidney biopsy.

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Table 1 – Review of published cases of AKI due to carambola consumption.

	Age	Gender	GI	NRL	Baseline Cr.	Maximum Cr.	Proteinuria	Urinary sediment	Biopsy	HD (number)	Final Cr. (days)
Chen et al.[1]	77	Male	Yes	No	ND	12 mg/dl	No	Haematuria, leukocyturia	Yes (oxalate nephropathy)	Yes (2)	1.5 mg/dl (28)
	38	Male	Yes	No	ND	11.7 mg/dl	Yes	Haematuria, leukocyturia	Yes (oxalate nephropathy + IgAN)	Yes (5)	1.5 mg/dl (28)
Neto et al.[5]	48	Male	No	Yes	79.5 μmol/l	–	ND	Anodyne	No	No	97.2 μmol/l (ND)
	49	Male	Yes	Yes	88.4 μmol/l	548 μmol/l	ND	Haematuria	No	No	97.2 μmol/l (ND)
	67	Female	Yes	Yes	106.2 μmol/l	530 μmol/l	ND	Leukocyturia	No	No	106.2 μmol/l (ND)
	66	Male	Yes	Yes	88.4 μmol/l	495 μmol/l	ND	Leukocyturia	Yes (oxalate nephropathy)	No	88.4 μmol/l (ND)
	34	Male	Yes	No	97.2 μmol/l	353 μmol/l	ND	Leukocyturia	Yes (oxalate nephropathy)	No	97.2 μmol/l (ND)
Su et al.[6]	63	Female	No	No	ND	16.4 mg/dl	Yes	Haematuria	Yes (oxalate nephropathy)	No	0.92 mg/dl (28)
Scaranello et al.[7]	44	Female	Yes	No	0.8 mg/dl	12.3 mg/dl	Yes	Haematuria, leukocyturia	No	Yes (2)	1.1 mg/dl (10)
Abeysekera et al.[2]	56	Female	Yes	No	80 μmol/l	290 μmol/l	Yes	Haematuria	Yes (oxalate nephropathy)	No	85 μmol/l (21)

Cr.: serum creatinine; GI: gastrointestinal history; HD: haemodialysis; ND: no data; IgAN: IgA nephropathy; NRL: neurological history.

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