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CASE REPORT

# Desmopressin as treatment of anemizing hematuria secondary to platelet dysfunction in the setting of uremia

*Desmopresina como tratamiento de la hematuria anemizante secundaria a la disfunción plaquetaria en el contexto de la uremia*

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## Abstract

Uremia is a condition that eases bleeding in patients with chronic kidney disease. We present the case of a 68-year-old male in current predyalisis situation, who was admitted for transurethral resection of a bladder tumor, suffering from hematuria in the postoperative period, which stopped after treatment with desmopressin.

*Key words:* Desmopressin, anemizing hematuria, platelet dysfunction, uremia.

## *Resumen*

La uremia es una condición que facilita el sangrado en pacientes con enfermedad renal crónica. Presentamos el caso de un varón de 68 años en situación actual de predilección, que ingresó para resección transuretral de un tumor vesical, sufriendo hematuria en el postoperatorio, que cesó tras el tratamiento con desmopresina.

*Palabras clave:* Desmopresina, hematuria anemizante, disfunción plaquetaria, uremia.

## Introduction

Hematuria is a common complication in the postoperative period of endoscopic surgery. Anemia is considered an independent predictor of high postoperative morbidity and mortality[1]. The possible risk of transmission of infections as well as the reactions associated with the transfusion of blood products has aroused interest in agents that reduce blood loss, such as tranexamic acid or desmopressin (DDAVP)[2].

## Case presentation

68-year-old male, former smoker, with a history of hypertension, type 2 diabetes mellitus and diabetic nephropathy for which he received a kidney transplant 7 years ago, in current pre-dialysis situation with residual diuresis of 1.5 liters, baseline creatinine of 3.5 mg/dl and estimated glomerular filtration rate of 17 mL/min /1.73m$^2$ according to the Modification of Diet in Renal Disease (MDRD). On antiplatelet therapy with acetylsalicylic acid 100 mg because of a coronary stent implantation 24 years ago due to ischemic heart disease. He has received a follow-up from 2008 onwards because of a recurrent low-grade pTa urothelial transitional cell carcinoma.

He was admitted for a scheduled surgical intervention of a new bladder tumor recurrence, endoscopically observed as extensive papillary areas at the bladder fundus, dome and left lateral side. According to the physical examination, the abdomen was soft and depressible, with no masses or megalies, and digital rectal examination was normal. Transurethral resection of the described bladder lesions was carried out without intraoperative complications, after a previous interruption of antiplatelet treatment for 7 days.

In the first postoperative hours the patient came up with gross hematuria without hemodynamic repercussion and associating few clots which were manually evacuated. Despite achieving clearing up of the urine by continuous bladder irrigation, hematuria reappeared once and again after its withdrawal.

Blood test showed progressive anemization, up to a minimum hemoglobin of 6.8 g/dl and hematocrit of 20% in a few days, requiring red blood cell transfusion during admission. Likewise, an exacerbation of his basal thrombopenia was observed, presenting 93,600/µL platelets on the first postoperative day. His renal function also got worse presenting a creatinine of 5.3 mg/dl and uremia increased up to 218 mg/dl. Renal ultrasound described absence of hydronephrosis in the kidney graft. Regarding coagulation parameters, a slight initial alteration was observed - prothrombin time (PT) being 62% and an international normalized ratio (INR) of 1.37 - returning

to normal values after administration of a dose of 10 mg phytomenadione.

Given the persistence of hematuria refractory to bladder irrigation withdrawal, and due to platelet dysfunction in the setting of a patient with chronic renal failure, a single dose of desmopressin 0.3 mcg/kg solution was administered in 30 minutes, being this effective, after which hematuria definitely stopped. The first postoperative cystoscopy ensured the absence of tumor recurrence. The patient has not suffered from new episodes of hematuria so far.

## Discussion

Bleeding and hemostasis defects are two common complications of uremia. This bleeding may be associated with ineffective binding of the von Willebrand Factor (a component of factor VIII) to platelet membranes, acquired storage-pool deficiency, and anemia. In relation to this, alterations in the synthesis of prostaglandins, defects in platelet aggregation or platelet retention have been reported. These defects can contribute to prolonged bleeding times in patients with uremia. Uremic patients may develop epistaxis, purpura, and bleeding from the gastrointestinal tract or urinary tract. The standard treatment for bleeding derived from uremia is dialysis, however, it does not completely correct platelet dysfunction and so, it is sometimes ineffective. Therefore, both cryoprecipitates and desmopressin (DDAVP) have been studied as alternatives when an immediate effect is desired[3,4].

Desmopressin is a synthetic analog of the antidiuretic hormone vasopressin, the first clinical use of which was established in 1977 as a treatment for diabetes insipidus. Its mechanism of action is based on the increase in plasma levels of von Willebrand factor (vWF), coagulation factor VIII and activation of tissue plasminogen (t-PA), shortening the activated partial thromboplastin time (aPTT) and bleeding time. In addition, it exerts a vasodilator effect which is explained by a direct action on the endothelium, from the activation of endothelial vasopressin receptors (V2R) and and cAMP-mediated signaling[5].

Desmopressin can be administered intravenously (0.3 micrograms / kg diluted in 50-100 ml of isotonic saline by infusing over 30 minutes), subcutaneously, or intranasally. It takes approximately 30 minutes to reach its peak concentration and this effect lasts for about 8 hours[6]. Tachyphylaxis is to be considered after the second dose due to the depletion of multimers from endothelial storage.

Despite not being an agent commonly used in the treatment of hematuria, it has the advantages of being an inexpensive drug with a good safety profile, and also avoids the risk of transmission of viral infections related to transfusion. Because of that, it has already proved useful in the prevention of bleeding from minor procedures such as kidney or liver biopsy, where the risk of bleeding is below 1%[2].

Von Willebrand Factor is essential for forming normal clots through platelet adhesion and the aggregation that follows endothelial damage. Increasing vWF levels in patients undergoing interventional or surgical procedures may reduce or even prevent bleeding loss, therefore reducing the need for red blood cell transfusion. Prevention of bleeding in patients with platelet dysfunction is of particular interest. Uremia, which associated with platelet dysfunction, can result in a major bleeding event after an invasive procedure or surgery that may be aggravated by antiplatelet agents. In this setting, a single infusion of desmopressin before invasive procedures in uremic patients on antiplatelet drugs appeared to be well tolerated and improved platelet dysfunction measured by collagen/epinephrine-closure time[7]. Moreover, as a result of its quick response in these patients and its high availability, desmopressin is a cheap drug that should be beared in mind when managing bleeding complications such as gross hematuria in a postoperative setting.

## Conclusions

Platelet disfunction caused by uremia can ease the onset of hematuria after a minor procedure or surgical intervention. Desmopressin proved an effective agent in the treatment of persistent and anemizing gross hematuria in this setting.

### Conflict of interests

The authors have no conflict of interest.

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