Urology Case Reports 36 (2021) 101561

Contents lists available at ScienceDirect

Urology Case Reports

journal homepage: http://www.elsevier.com/locate/eucr

Endourology

Using alteplase nephrostomy tube installation for thrombolysis of ureter tract clot obstruction

Paoyan Lin *, Tomasz Fiutowski, Christoph Ansorge

Nyköping Lasarett, Department of Surgery and Urology, Sweden

ARTICLE INFO

Keywords:
Ureteral obstruction
Tissue plasminogen activator
Nephrostomy
Percutaneous
Thrombolytic therapy

ABSTRACT

In literature, few cases have been reported regarding the use of alteplase installation in a nephrostomy as anticoagulant treatment of blood clots in the upper urinary tract.

Our case -report provides a unique case of alteplase installation in the nephrostomy tube for thrombolysis of a blood clot formation in the upper ureter. The blood clot formation emerged as acute obstruction following a planned endoscopic lithotripsy. A new protocol for alteplase installation for percutaneous nephrostomy is presented in this article.

Introduction

Alteplase is an established drug for the management of myocardial infarction and stroke. It acts as a recombinant tissue plasminogen activator which cleaves plasminogen to its active form, plasmin, where it degrades fibrin resulting in dissolution of blood clots.[1] Previous studies have reported the use of the recombinant tissue plasminogen nephrostomy installation for resolution of upper urinary tract clots for tube patency in an obstructed nephrostomy tube,[1] as well for thrombolytic management of a renal pelvis clot.[2]

Further, for lower urinary tract clots, there is one report of infravesical clot lysis using installation of alteplase through a Foley catheter.[3] However, in the last decade, there are limited reports with cases utilizing thrombolytic in the urinary tract. In this study, we present a case-report of a patient with a post-operative blood clot causing ureter obstruction who underwent outpatient treatment with thrombolytic therapy.

Case presentation

The patient in this study was a 73-years-old Caucasian man with a medical history of seven myocardial infarcts, type 2 diabetes mellitus and diabetic nephropathy (normal serum creatinine around 140 μmol/L). The patient that was presented to the emergency department had left back pain and acute renal failure with kidney creatinine of 196 μmol/L and C-reactive protein 31 mg/L. Computer tomography showed a spontaneous rupture of the left renal pelvis caused by an obstruction 1,52 cm below the pelvic ureteric junction. The patient acquired a percutaneous nephrostomy for decompression of the upper urinary tract and was discharged from the hospital with serum creatinine 143 μmol/L and C-reactive protein 18 mg/L. Diagnostic ureteroscopy was planned within a month and the patient underwent ureteroscopy that revealed a ureter calculus that was fragmented using laser lithotripsy. Fluoroscopy during the surgery showed that the patient was stone-free, and the patient received a ureter stent size French 6/length 24 cm. The nephrostomy was dismantled and the patient was discharged with a follow-up removal of the ureter stent after five weeks.

Three days after the removal of the ureter stent, the patient developed fever (38° Celsius) and back pain. Laboratory values in the emergency department showed C-reactive protein 56 mg/L, white blood cell count 18 $\times$ 10^9/L and serum creatinine 170 μmol/L.

A computer tomography showed pyelonephritis and hydronephrosis on the left side. The patient was readmitted and acquired a new nephrostomy for urinary decompression (Fig. 1) and was administered antibiotics. The obstruction was caused by a post-operative clot formation. The patient was later discharged with neph rostomy and antibiotics per os.

Because of the patient's comorbidity and risk for infection, a watchful period was initiated with the expectation of fibrinolytic activity of urokinase-type plasminogen in the urine. A waiting period was established for 10 weeks and a control antegrade pyelography from the nephrostomy showed a persisting obstruction in the upper ureter (Fig. 2). Surgical intervention was considered a high-risk for another cardiovascular event or a pyelonephritis infection that may result in worse kidney function. The patient also wished for no further surgical

* Corresponding author. Nyköping lasarett Olrogs väg 1, 611 39, Nyköping, Sweden.
E-mail address: Paoyan.lin@regionsormland.se (P. Lin).

https://doi.org/10.1016/j.eucr.2021.101561
Received 16 December 2020; Received in revised form 30 December 2020; Accepted 4 January 2021
Available online 12 January 2021

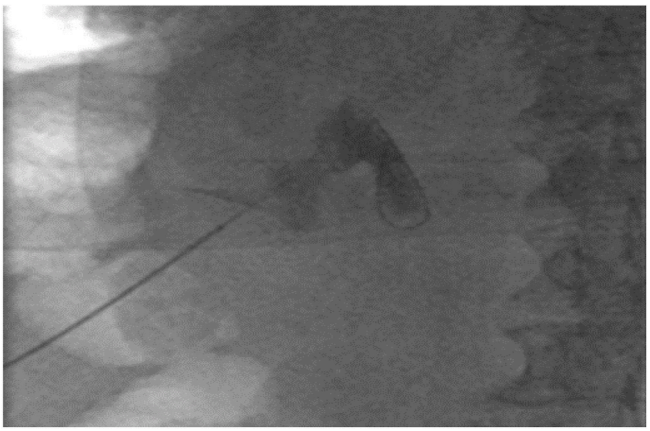

Fig. 1. Antegrade pyelography showing obstruction.

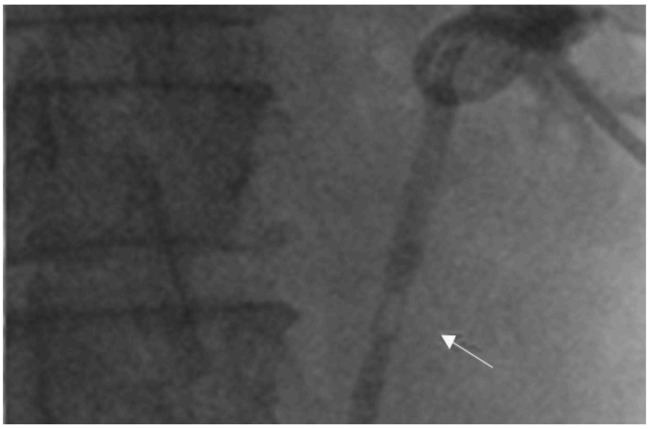

Fig. 2. Antegrade pyelography showing the clot (white arrow).

interventions. Instead, a less invasive method was established using alteplase. The patient showed no symptoms while the nephrostomy tube was left open, and hence gave his consent for alteplase installation.

The protocol that was established for alteplase infusion was installation of 10 mg alteplase in the nephrostomy tube, which was clamped for 30 minutes; next it was re-opened and flushed with 10 ml saline solution (9 mg/ml); this procedure was performed twice in a 7-days period in an outpatient setting. The patient underwent a new antegrade pyelography confirming that the obstruction was dissolved (Fig. 3). The nephrostomy was dismantled and the patient had a 3-months follow-up at the urology office without any further complications. Laboratory values was; C-reactive protein <5 mg/L and serum creatinine 155 μmol/L.

Discussion

Obstruction in the urinary system is a urologic emergency, and to save renal function it is critical to obtain adequate drainage where failure may result in declining renal function ultimately requiring dialysis. In the urine, there is urokinase that is a physiological plasminogen activator, which facilitates clot lysis. The use of Alteplase for the urinary tract has yet to be approved by the Food and Drug Administration. Alteplase studies have been conducted on animals[4] and in vitro[5] for thrombolytic therapy urinary tract but yet not utilized in humans. The present case report demonstrates the first case of an alteplase installation clot dissolution in the ureter using the nephrostomy tube for an outpatient.

In this case, infection and endoscopic intervention likely led to the clot obstruction. The patient acquired a nephrostomy tube as drainage

Fig. 3. Follow up antegrade pyelography after alteplase installation.

and because of the patient's comorbidity, non-surgical treatment was initiated.

Conclusion

Urinary obstruction from clot formation is a medical complication that may occur after urologic endoscopy in the ureters. In case conservative methods do not yield dissolution of the clot, and surgical intervention is of high risk, then our suggested protocol provided in the current paper may be considered for out-patient thrombolytic therapy. Our report contributes a unique case of outpatient alteplase installation through the nephrostomy for clot-dissolving. Similar out-patients can be treated with alteplase for blood clots obstructions in the urology reception with a follow-up radiology.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying image. A copy of the written consent is available for review by the editor-in-chief of this journal on request.

Financial conflict of interest

None.

Declarations of competing interest

None.

Acknowledgments

No funding sources or assistance were necessary for the conduct of the study.

References

1. Pautler SE, Luke P, Chin JL. Upper tract urokinase instillation for nephrostomy tube patency. *J Urol.* 1999;161(2):538–540.
2. Mahmoud A, Manka M, Lipworth R, et al. Alteplase instillation for upper urinary tract clot dissolution. *Journal of endourology case reports.* 2019;5(1):16–18. https://doi.org/10.1089/cren.2018.0088.
3. Olarte JL, Glover ML, Totapally BR. The use of alteplase for the resolution of an intravesical clot in a neonate receiving extracorporeal membrane oxygenation. *Am*

Soc Artif Intern Organs J. 2001;47(5):565–568. https://doi.org/10.1097/00002480-200109000-00034.

4. Hooi KS, Lemetayer JD. The use of intravesicular alteplase for thrombolysis in a dog with urinary bladder thrombi. *J Vet Emerg Crit Care*. 2017;27(5):590–595. https://doi.org/10.1111/vec.12627.
5. Ritch CR, Ordonez MA, Okhunov Z, et al. Pilot study of Alteplase (tissue plasminogen activator) for treatment of urinary clot retention in an in vitro model. *J Endourol*. 2009;23(8):1353–1357.