



## Endourology

## Unexpected case of large ureteric calculus being passed following prostatic artery embolisation

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## A B S T R A C T

Spontaneous passage of large ureteric calculi over 10mm is uncommon. We present a case of a 69-year-old male with a significant prostatic enlargement (150 cc) and a 13mm ureteric calculus which had not passed for 3 months following a failed attempt at ureteroscopy. His stone passed spontaneously following prostatic artery embolisation (PAE), performed for symptomatic benign prostatic hypertrophy (BPH). We consider the mechanisms by which PAE may impact on the distal ureter which allowed stone passage.

## Introduction

The passage of large ureteric calculi over 10mm in size is rare. Obstruction secondary to these stones, results in the impairment of urine drainage and subsequent hydronephrosis. Concurrent benign prostatic hyperplasia can also cause anatomical distortion of the upper tracts, secondary to chronic urinary retention, which results in detrusor hypertrophy and resultant obstruction at the vesico-ureteric junction.<sup>1</sup> In this case, a patient presented with a symptomatic 13mm left ureteric calculus as well as evidence of significant benign prostatic hyperplasia (BPH). This had resulted in significant hydronephrosis and tortuosity of the ureter, which restricted access to the stone. A decision was made to treat the BPH first, with the hypothesis that by doing so it may aid in the resolution of the distorted shape of the ureter and facilitate endoscopic treatment of the stone. Subsequently following prostate artery embolisation, the stone was found to have passed spontaneously. We describe some of the possible reasons of how this may have occurred.

## Case report

A 69-year-old male presented to hospital with left abdominal and flank pain and was found to have a 13mm ureteric calculus immediately proximal to the left vesico-ureteric junction (VUJ) [Fig. 1]. Computed tomography (CT) imaging also showed significant prostate enlargement (150 cc).

As the patient was on dual anti-platelet agents for a recent

myocardial infarction and insertion of a drug eluting cardiac stent, medical expulsive therapy was trialled given the absence of ongoing pain, infection or renal failure. Progress CT imaging performed two months later revealed no movement of the calculus. A reconstructed CT image revealed persisting left hydronephrosis with a very tortuous ureter and an enlarged prostate [Fig. 2]. The patient was taken to theatre where a retrograde pyelogram demonstrated significant S-shape kinking of the distal ureter with a highly tortuous proximal ureter. Attempts to navigate the S-bend in the ureter with multiple wires were unsuccessful and the procedure was abandoned. Following this procedure, the patient went into acute urinary retention with multiple failed trial of voids in the following weeks.

The patient underwent prostate artery embolisation (PAE) for his prostate enlargement. Given his recent cardiac event, other operative techniques such as a routine transurethral resection of prostate (TURP) were felt to be too high risk. His antiplatelet agents were continued peri-operatively. The PAE was performed in an angiography suite, under local anaesthesia. Vascular access was attained via the femoral artery.

Following PAE, the patient subsequently had a progress CT scan which revealed that the ureteric calculus had unexpectedly and spontaneously passed into the bladder [Fig. 3]. The patient then underwent cystoscopy which demonstrated significant reduction in the size of the median lobe of the prostate and underwent a routine laser cystolitholapaxy for the stone. The patient made a full recovery and was counselled on lifestyle measures to prevent further stone formation.

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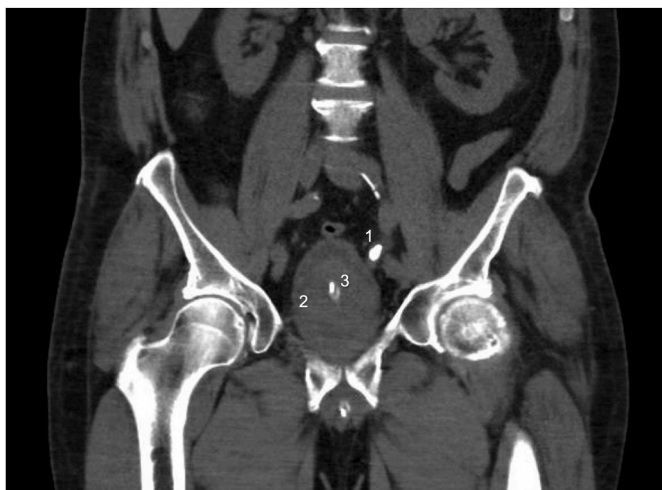
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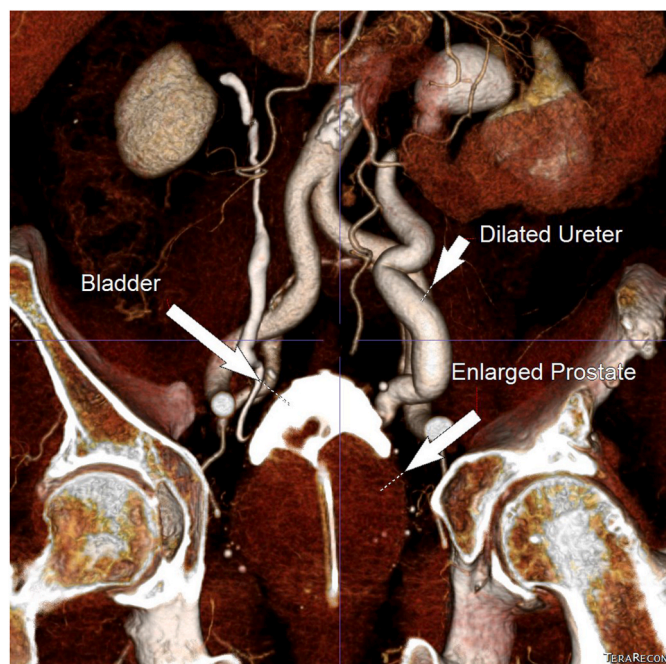
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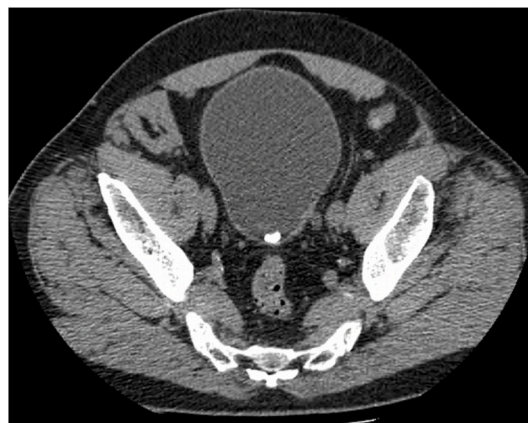
**Fig. 1.** Large distal ureteric calculus (1) and grossly enlarged prostate with appreciable intravesical extension (2). The tip of an indwelling catheter can also be seen (3) as the patient had developed acute urinary retention at the time of the scan.



**Fig. 2.** CT reconstruction demonstrating the tortuosity of the left ureter, contrast in the bladder and an enlarged prostate.

## Discussion

The key factors which dictate the spontaneous passage of ureteric stones are stone width, length, and location.<sup>2</sup> A study of 850 patients with ureteric stones were evaluated retrospectively to determine the rate of spontaneous passage based on these factors. Of stones greater than 7mm in either width or length as measured by a non-contrast CT and in either the distal ureter or vesico-ureteric junction, the rate of spontaneous passage was approximately 27–33%.<sup>2</sup> Thus, it was highly unlikely that despite conservative management with an alpha blocker, that the patient's stone in this case would pass based on the size of the calculi as well as the curvature of the distal ureter. Medical expulsive therapy was trialled in this patient due to his high anaesthetic risk from recent myocardial infarction and absence of ongoing pain, infection or renal



**Fig. 3.** Large calculus now seen in the urinary bladder that had spontaneously passed after prostate artery embolisation.

failure.

We hypothesise two potential mechanisms for the spontaneous passage of the large ureteric calculi following prostate artery embolisation. Firstly, a reduction in the size of the prostatic median lobe may have allowed the ureter to straighten out, removing the S-curve previously encountered on ureteroscopy.

Secondly the PAE may have potentially affected the distal ureter through relative ischaemia resulting in smooth muscle relaxation. PAE is an alternative to a TURP for patients suffering from BPH. The major advantage of the procedure is that it is less invasive, though its efficacy in relieving acute urinary retention is inferior.<sup>3</sup> The current European Association of Urology (EAU) guidelines have reported that PAE does result in less blood loss and hospitalisation time for patients compared to TURP, though further research is needed to delineate when it should be utilised for treatment of BPH.<sup>4</sup> The procedure can be performed under a local anaesthetic, were the femoral artery is punctured and an angiogram to map the branches of the internal iliac artery performed to identify the branches supplying the prostate – predominately from the inferior vesical artery.<sup>3</sup> Catheterisation and selective embolisation of the arteries supplying the prostate then occurs.<sup>2</sup> The blood supply to the ureter is segmental and distally it does receive supply from the superior and inferior vesical arteries.<sup>5</sup> If ischaemia of the ureter occurs as a result, the calcium flux through the ureteric smooth muscle may be impacted and hence its peristalsis.<sup>4</sup> This in turn may lead to dilatation, promoting stone passage.

This is the first documented case demonstrating passage of a large ureteric calculus following PAE. For patients presenting with large impacted ureteric stones which are difficult to access due to prostatic enlargement, addressing this prostatic enlargement should be considered. Reducing prostatic adenoma via medication, PAE or other surgical techniques should allow easier access to the upper tracts for ureteroscopy and laser lithotripsy or as seen in this case, potentially promote spontaneous stone passage.

## Consent

Consent was obtained from the patient for publication of this case report and accompanying images.

## Acknowledgments

Nil.

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