



# Recurrent urinary tract infections in a patient with neurogenic bladder

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### Implication for health policy/practice/research/medical education:

We introduce a patient with recurrent urinary tract infections (UTIs). A neurogenic bladder was diagnosed in further studies. Here, we emphasize the role of VCUG (voiding cystourethrogram) in recurrent UTIs when there is a high suspicion of anatomical defects.

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A 3-year-old girl was referred to our center for acute pyelonephritis. She has been febrile since four days ago. She had complaints of dysuria and loss of appetite. Her mother mentioned another febrile urinary tract infection (UTI) two years ago that was treated using oral antibiotics in her past medical history. Left hydronephrosis had been reported on her ultrasonography during her previous UTI. Her laboratory exams showed elevated C-reactive protein (CRP), pyuria and negative blood culture. More than  $10^5$  *E. coli* colonies were counted on her urine culture, representing a positive culture for these bacteria. Abnormal findings in ultrasonography with post-void residual volume included a renal pelvis anteroposterior diameter of 8 mm and a post-void residual volume of 17 cc. Bladder wall thickness and bladder shape were reported normal. Based on the Coff's formula, the estimated normal bladder capacity =  $(age+1) \times 30$  (1). Therefore, in this patient, estimated bladder capacity equals to 120ml. Post-void residual volume of more than 10% of bladder capacity is considered abnormal (2). An increased post-voiding residual volume in this patient suggested a neurogenic bladder. Therefore, a voiding cystourethrogram (VCUG) was conducted. In VCUG, we did not see any signs of vesicoureteral reflux, however a vertical bladder was seen, suggesting a neurogenic bladder diagnosis (Figure 1).

Accordingly the anticholinergic agent, solifenacin 5 mg daily was administered, with a third-generation cephalosporin. The patient responded well to the treatment. Forty-eight hours after the beginning of

treatment, the patient improved significantly. Her fever stopped, the general condition improved and pyuria resolved. Serum CRP decreased on the fifth day since the initiation of medication. Two days after the resolution of fever, the patient was discharged with an oral antibiotic, cefixime 8 mg/kg/d divided by two doses per day. At a 6-month follow-up, no UTI has been diagnosed in the patient.

We suggest that in patients with recurrent UTIs and an increased post-void residual volume who are at high suspicion for neurogenic bladder diagnosis, VCUG is preferable to direct radionuclide cystography (DRNC). While, in VCUG, the shape of the bladder and its anatomical and functional defects can be observed. Although DRNC has much less radiation exposure and



**Figure 1.** Voiding cystourethrogram of a 3-year-old girl with recurrent urinary tract infection. Notice that there are no signs of vesicoureteral reflux. A vertical bladder can be seen, suggesting a neurogenic bladder.

higher sensitivity for diagnosing vesicoureteral reflux, VCUG is more useful when a neurogenic bladder is considered at the top of the differentials.

#### Authors' contribution

EE and AA were the principal investigators of the study. EE, AA and AO were included in preparing the concept and design. EE and AO revisited the manuscript and critically evaluated the intellectual contents. All authors participated in preparing the final draft of the manuscript. All authors have read and approved the content of the manuscript and confirmed the accuracy or integrity of any part of the work.

#### Ethical issues

Ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the authors. The patient gave the consent to publish as a case report.

#### Conflicts of interest

The authors declare that they have no competing interests.

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