# Case Report

# Ultrasound bladder scanner presents falsely elevated postvoid residual volumes

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## Case description

An 83-year-old woman with severe Alzheimer dementia was admitted with verbal and physical aggression to the acute Care of the Elderly unit. Because the patient had incontinence, postvoid residual (PVR) volumes were measured using a portable ultrasound bladder scanner. Postvoid residual urine volumes, measured on several different occasions, ranged from 403 to 855 mL, with only 75 to 200 mL drained by in-and-out catheterization.

As a result of this discrepancy, an abdominal and pelvic ultrasound was done. This demonstrated a great number of bilateral cystic lesions around the left kidney and a complex cystic lesion in the pelvis. Subsequently, the patient underwent a computed tomographic (CT) scan of the abdomen and pelvis. This revealed at least 10 cystic lesions on the left kidney, the largest of which measured 11x12x14 cm, extending from the lower pole of the left kidney and into the pelvic region (**Figure 1**). Ovarian cystic lesions were also seen on the pelvis (**Figure 2**). All the cystic lesions were consistent with benign simple cystic lesions.

## Discussion

Portable ultrasound bladder scanning is frequently done in elderly patients; ultrasound bladder scans assess urinary retention and are part of the workup in the assessment of urinary incontinence. In all hospitals, and in some clinics, bladder scanning is routinely used to assess urinary retention and incontinence because it is noninvasive and there is no risk of injury or discomfort to the patient. Bladder emptying is assessed by determining the presence of residual urine in the bladder immediately after voiding.

There are 2 methods for estimating PVR urine volume: urethral catheterization and bladder ultrasound. In-and-out catheterization can be done after asking the patient to void. A PVR volume of less than 50 mL is considered adequate bladder emptying; in the elderly, between 50 and 100 mL is considered normal.[1] In general, a PVR volume greater than 200 mL is considered abnormal and could be due to incomplete bladder emptying or bladder outlet obstruction. A PVR volume greater than 400 mL is considered to be high.

In the clinical setting, when the patient has a high PVR volume, the nurse will attempt to provide relief by inserting an in-and-out catheter. A high PVR volume recording by bladder scan should correlate with the in-and-out catheterization done in clinical practice. In the case of our 83-year-old patient, the high PVR volume seen on bladder scan was owing to the presence of pelvic and kidney cysts and not to urinary retention. There are few case reports that have discussed cystic and pelvic pathology presenting as falsely elevated PVR urine when measured by portable bladder scanner.[2-4]

**Figure 1. Large renal cyst, extending from the lower pole of the left kidney toward the bladder area**

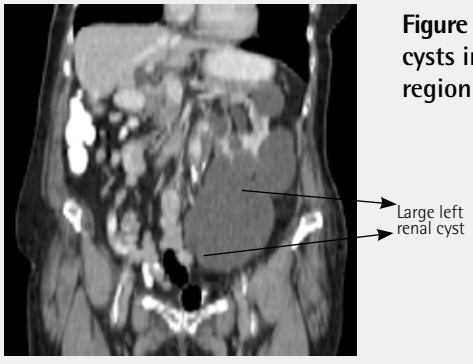
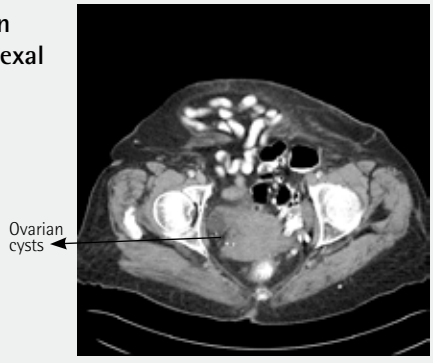



**Figure 2. Ovarian cysts in the adnexal region**




The cystic lesions presented as falsely elevated PVR volumes when measured by a portable bladder scanner. (The sagittal section view in **Figure 1** shows how the large left-sided renal cyst, which is extending from the lower pole of the left kidney into the pelvic region, could be misinterpreted as the bladder.) Both the large left-sided renal cyst and the ovarian cysts were likely to have been picked up by the bladder ultrasound.

Understanding the results of a bladder ultrasound requires special skills on the part of the performing technologist. A patient's characteristics are also a factor to successful interpretation of the ultrasound. Sonographic

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**EDITOR'S KEY POINTS**

- Urethral catheterization and bladder ultrasound scanning are the 2 methods used to measure post-void residual (PVR) urine volume.
- A high PVR volume recorded by a bladder scan should correlate with in-and-out catheterization. Any discrepancy in PVR volume between these 2 devices should alert the health care professional to look for cystic and pelvic pathology, which can present as falsely high PVR volumes.

**POINTS DE REPÈRE DU RÉDACTEUR**

- La sonde urétrale et le balayage échographique de la vessie sont les 2 méthodes utilisées pour mesurer le volume urinaire résiduel post-mictionnel (RPM).
- Un volume RPM élevé enregistré par balayage de la vessie devrait être en corrélation avec le cathétérisme entrée-sortie. Tout écart du volume RPM entre ces 2 dispositifs devrait avertir le professionnel de la santé qu'il doit chercher la présence d'une pathologie cystique et pelvienne, qui peut se présenter sous forme de volumes RPM faussement élevés.

images are limited somewhat by the patient's body habitus, as the modality requires sound waves to travel through the body in order to create an image. Obese patients generally produce lower-quality images. Simple cysts are predominantly echo free and the echogenicity looks similar to water. The advantage of the bladder ultrasound scanner is that it is both the least expensive of all cross-section imaging modalities and portable, as it can be used at the bedside; its disadvantage, however, is that it is operator dependent.

## Conclusion

When using a portable ultrasound bladder scanner to assess the PVR urine volume, health care professionals should be aware of the possibility of a falsely elevated PVR. Any difference or discrepancy between the results of the bladder scanner and the in-and-out catheter should alert the health care professional to look for cystic and pelvic pathology, which can present as falsely high PVR volumes.

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**Competing interests**
None declared

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# Genetics

## *Codeine metabolism*

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*A woman took normal doses of codeine following childbirth, but her body converted more codeine into the active metabolite morphine than expected. Genetic testing indicated that she was an ultrarapid metabolizer of the drug. This resulted in high levels of morphine in her breast milk and lethal levels in her newborn.*[1]

Pharmacogenetics is the interaction between drugs and one's genetic makeup. The clinical application of pharmacogenetic testing is limited. It is not practical to prescreen every patient for whom codeine is prescribed. Most women metabolize codeine at the normal rate and its use while breastfeeding is considered safe.

***Bottom line.*** It is recommended that all nursing mothers using codeine minimize duration of therapy and monitor their babies for signs of respiratory depression. Genetic testing for drug metabolizer genes is not standard practice, but might be considered following severe adverse drug reactions.

The complete *Gene Messenger—Codeine Metabolism* by the GenetiKit research team is available on **CFPlus.*** Past Gene Messenger articles can be accessed on-line at **www.cfp.ca**. On the homepage, click on **Collections** in the left-hand menu, then click on **Genetics**.

**Competing interests**
None declared

The **GenetiKit** research team, a group of family physicians, genetic counselors and geneticists, designed the Gene Messenger series to provide practical information to help family physicians and their patients make informed choices about rapidly emerging genetic discoveries. The series is a collection of up-to-date, definitive, short reviews on genetics topics that have made headlines, and offers recommendations regarding referral for genetic services or testing.

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*The Gene Messenger on codeine metabolism is available at **www.cfp.ca.** Go to the full text of this article on-line, then click on **CFPlus** in the menu at the top right-hand side of the page.