Bladder scanner pitfalls: beware ovarian cysts

Introduction

This article presents two cases highlighting some potential pitfalls of the bladder scanner. A 57-year-old woman presented with an indwelling catheter and a bladder scan result of over 700 ml. Reinsertion of a new indwelling catheter resulted in no change in the bladder scan result. She was thought to have either a blocked or incorrectly placed indwelling catheter. A computed tomography scan showed a large pelvic mass reported as a distended bladder with the indwelling catheter embedded within a bladder mass. A computed tomography cystogram clarified that the indwelling catheter was correctly placed within the true bladder and a large pelvic cyst was compressing the bladder.

In the second case, an 88-year-old woman was deemed to have failed her trial of void as the bladder scanner showed large post void residuals. A computed tomography scan again showed a pelvic cystic mass compressing the bladder. The literature has been reviewed for other cases where bladder scanner results have been falsely elevated as a result of other pathology.

Discussion

The bladder scanner has become a frequently used investigation to measure post void residual bladder volumes. It is a fast, easy to operate, inexpensive, non-invasive and sensitive tool. These cases highlight a pitfall of the bladder scanner: that a pelvic mass can erroneously cause an elevated bladder scan result.

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The authors conducted a literature search using Medline (1946–2013) and Embase (1980–2013) databases to find other cases where the bladder scanner has incorrectly reported other pelvic pathology as an elevated bladder urine volume.

The authors found nine publications containing 23 cases where pelvic or abdominal pathology has been the cause of a raised bladder scan result. There was one published case in which a male had intra-abdominal malignancy (Simko et al, 2002). The remaining cases were all female.

The most common published cause of a falsely elevated bladder scan result was an ovarian cyst; other causes included adenomyosis, uterine myomas, hydrosalpinx, benign cystadenoma, cystadenocarcinoma, intestinal malignancy and abdominal ascites (Cooperberg et al, 2000; Dunn and Palmer, 2000; Simko et al, 2002; Tan et al, 2003; Adam and Taghechian, 2007; Choe et al, 2007; Alagiokrishnan and Valreda, 2009; Morrell, 2010; Elsamra et al, 2011).

The current cases reinforce the potential pitfalls of the bladder scanner and highlight the importance of reviewing bladder scan results with circumspection.

The patient in the first case underwent multiple catheter re-insertions as a result of the persistently elevated bladder scanner reading, causing staff to believe a false passage was the most likely explanation. The computed tomography scan in the context of a highly elevated bladder scan result also coloured its interpretation by staff. As previous reports have stated, an elevated bladder scan result which has a significant discrepancy with the total urine output from a catheter always warrants further imaging (Cooperberg et al, 2000; Simko et al, 2002; Elsamra et al, 2011).

Uniquely, this case highlights that further imaging should not be focussed on the search for an enlarged bladder but focused on identifying the true pathology, in this case a cystic mass; the second case also highlights this. In cases where a significant discrepancy exists between clinical

Case Report 1

A 57-year-old woman was referred to the authors' institution with a poorly draining indwelling urinary catheter with the assumption the indwelling urinary catheter was not within the bladder. On presentation she denied any abdominal discomfort and examination revealed a palpable suprapubic mass, consistent with a distended bladder. Despite multiple re-insertions of the indwelling urinary catheter, no significant drainage was noted and repeat bladder scans reported over 700 ml of fluid within the bladder.

A computed tomography scan of the abdomen/pelvis with intravenous contrast was obtained and formally reported to show an enlarged bladder and wall thickening with a possible bladder mass lesion at the right bladder base. The indwelling urinary catheter was thought to be embedded within this region (*Figure 1*).

A computed tomography cystogram was performed by instilling 100 ml into the indwelling urinary catheter. The repeat computed tomography revealed the indwelling urinary catheter to be within the true urinary bladder, which had actually been displaced and compressed by a large ovarian cyst measuring 720 ml (*Figure 2*). Thus the ovarian cyst was the cause of the falsely elevated bladder scan result.

Case Report 2

An 88-year-old woman presented to the Trial Of Void clinic for removal of her indwelling urinary catheter, which had been inserted for urinary retention. She had good initial voids of 200–300 ml, but the bladder scanner continued to measure over 580 ml. She was deemed to have failed her trial of void, and a catheter was re-inserted. She was discharged for follow up with her urologist as an outpatient.

A computed tomography scan was initially reported to show mild bladder distension with no definitive pelvic mass. Retrospective review of her computed tomography showed a large pelvic cyst compressing and displacing her true bladder. She subsequently underwent a laparotomy and removal of the large ovarian cystic mass.

findings (e.g. indwelling catheter was placed easily with no resistance) and the computed tomography scan findings, a computed tomography cystogram should be considered. BJHM

Adam RA, Taghechian S (2007) Acute urinary retention caused by a large hydrosalpinx. *Int Urogynecol J Pelvic Floor Dysfunct* **18**(6): 691–2

Alagiakrishnan K, Valpreda M (2009) Ultrasound bladder scanner presents falsely elevated postvoid residual volumes. *Can Fam Physician* **55**(2): 163–4

Choe JH, Lee JY, Lee KS (2007) Accuracy and precision of a new portable ultrasound scanner, the BME-150A, in residual urine volume measurement: A comparison with the BladderScan BVI 3000. *Int Urogynecol J Pelvic Floor Dysfunct* **18**(6): 641–4

Cooperberg MR, Chambers SK, Rutherford TJ, Foster HE Jr (2000) Cystic pelvic pathology presenting as falsely elevated postvoid residual urine measured by portable ultrasound bladder scanning: Report of 3 cases and review of the literature. *Urology* **55**(4): 590

Dunn IB, Palmer M (2000) Erroneous diagnosis of chronic urinary retention in three women with pelvic cysts. *Scand J Urol Nephrol* **34**(6): 381–2

Elsamra SE, Gordon Z, Elsworth PI (2011) The pitfalls of the BladderScanTM PVR in evaluating bladder volume in adolescent females. *J Pediatr Urol* **7**(1): 95–7

Morrell GA (2010) False reading of retained urine from a bladder scan. *Urol Nurs* **30**(2): 147–8

Simko J, Patterson EJ, Duffy EG (2002) When bladder scans fail: three case studies. *Urol Nurs* **22**(4): 249–50

Tan TL, Ding YY, Lieu PK (2003) Letter to the editor: False positive findings in the ultrasound assessment of postvoid residual urine volume. *Age Ageing* **32**(3): 356–63

Figure 1. Case 1: initial computed tomography scan, (a) axial and (b) coronal views. Computed tomography reported as bladder wall thickening with a possible bladder mass lesion at the bladder base to the right (arrow). The indwelling urinary catheter was thought to be embedded within this region.

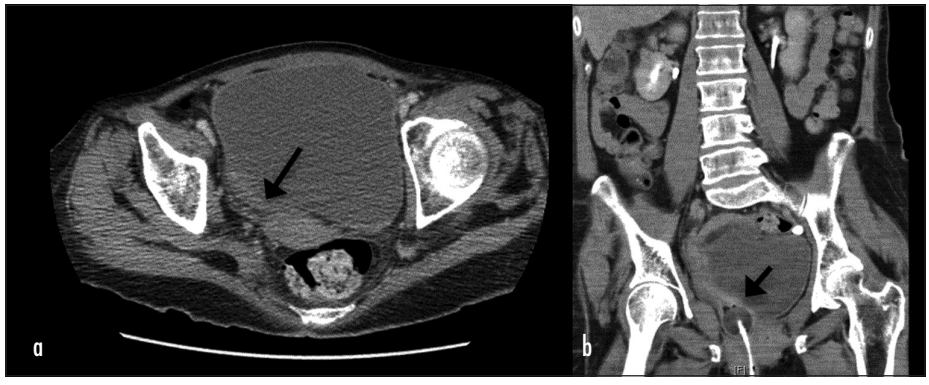
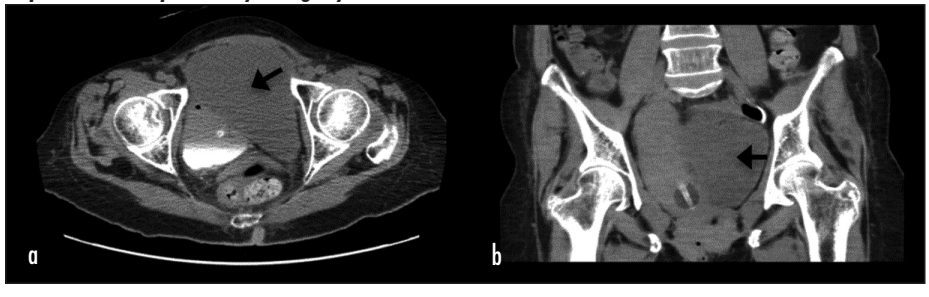


Figure 2. Case 1: repeat computed tomography scan (a) axial and (b) coronal views showing the indwelling urinary catheter proven to be within the urinary bladder deviated to right, which was in fact displaced and compressed by a large cystic structure (arrow).



LEARNING POINTS

- The bladder scanner may identify a fluid collection that is not specific to the bladder.
- Any disassociation between the bladder scanner and the catheterized volume of the bladder warrants further imaging and examination.
- When analysing imaging in the context of a raised bladder scanner result, it is very easy to focus on finding a distended bladder or bladder-related pathology. However, this could result in missing the true diagnosis. A computed tomography cystogram should be considered for these diagnostic dilemmas.