

# Inguinoscrotal Herniation of a Bladder Diverticulum on [Tc99m]-Methylene-Diphosphonate (MDP) Bone Scan Diagnosed with SPECT/CT

Ka Kit Wong<sup>1,2,\*</sup>, Benjamin L. Viglianti<sup>1</sup> and Milton D. Gross<sup>1,2</sup>

<sup>1</sup>Department of Radiology, University of Michigan, Medical Centre, USA

<sup>2</sup>Nuclear Medicine, VA Ann Arbor Healthcare, Ann Arbor, Michigan, USA

## Abstract

Inguinoscrotal hernias that contain bladder diverticulae are a rare occurrence. We report the case of a 85 year-old man with intense radioactivity overlying the left pubic tubercle on [Tc99m]-methylene-diphosphonate (MDP) bone scan. SPECT/CT imaging established the diagnosis of excreted urinary radioactivity within a large herniated bladder diverticulum. SPECT/CT is a useful technique for evaluation of non-osseous uptake on [Tc99m]-MDP bone scintigraphy.

**Keywords:** Inguinoscrotal Hernias; Radioactivity; Bone metastases; Bladder diverticulum

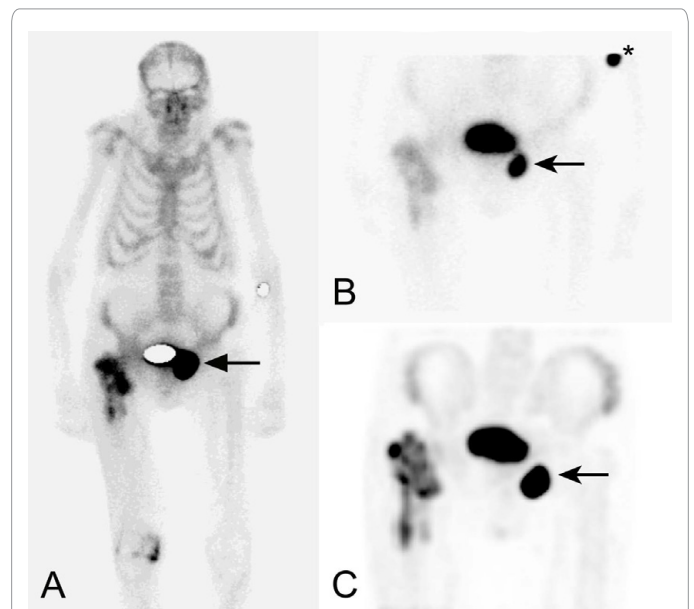
## Case Report

A 85 year-old man with prostate cancer (Gleason 6) diagnosed 13 years earlier underwent [Tc99m]-Methylenediphosphonate (MDP) bone scintigraphy for staging of bone metastases following a recent fall resulting in fracture of his right femoral neck. He had never received surgery, chemotherapy or external beam radiation treatment for treatment of his prostate cancer. He had been initially treated with leuprolide acetate (Lupron), then goserelin (Zoladex) and flutamide, and more recently bicalutamide. A DEXA scan performed 9 years earlier had shown osteoporosis of the lumbar spine (T score = -4.0) and hip (T score = -2.5). His Prostate Specific Antigen (PSA) was rising to 13.9 ng/ml at the time of the bone scan and his recent fall raised concerns for a pathologic fracture. He did not complain of urinary symptoms or significant bone pain. His WBC was 3.90 uL, Hb was 11.6 g/dL and Platelets were 148 uL. On examination his vitals were BP: 127/69 mmHg, HR 65 bpm, RR 20 and Temp 98.8. He was an elderly, kyphotic, man in no apparent distress with unremarkable physical examination. He had a [Tc99m]-methylene-diphosphonate (MDP) bone scan performed to evaluate for osseous metastatic disease. The bone scan showed intense radioactivity overlying the left pubic tubercle (Figure 1) which initially caused interpretative difficulties despite efforts to exclude surface contamination as the source of the observed radioactivity. The use of SPECT/CT imaging unequivocally established the diagnosis of excreted urinary radioactivity within a large herniated bladder diverticulum (Figure 2).

Inguinoscrotal hernias containing bladder diverticulae are rare with only 20 cases described in the English literature in a 2013 case-review [1]. Urological contents within inguinal hernias are important to diagnose occurring in 1-4% of cases, of which the majority are herniated bladder (61%) and ureter (34%), the rest being bladder diverticulae (5%) [1,2].

The mechanism for inguinal herniation is attributed to musculo-aponeurotic weakness of the abdomino-pelvic wall resulting from elevated intra-abdominal pressure [3]. Bladder diverticulae are believed to be due to increased intravesical pressure, therefore risk factors for herniated bladder and bladder diverticulae include male gender, age >50 years, obesity and benign prostatic hypertrophy resulting in obstructive uropathy [1,3]. Patients with inguinoscrotal bladder diverticulae often present with multiple urinary symptoms including urgency, nocturnal frequency, dysuria, poor flow and incomplete micturition, [1,3,4] and some patients may need to compress a groin swelling in order to complete urination (2-phase micturition) [5]. Cough impulse and groin swelling

may be indistinguishable from an inguinal hernia with omentum or bowel contents on physical examination. Patients with inguinoscrotal



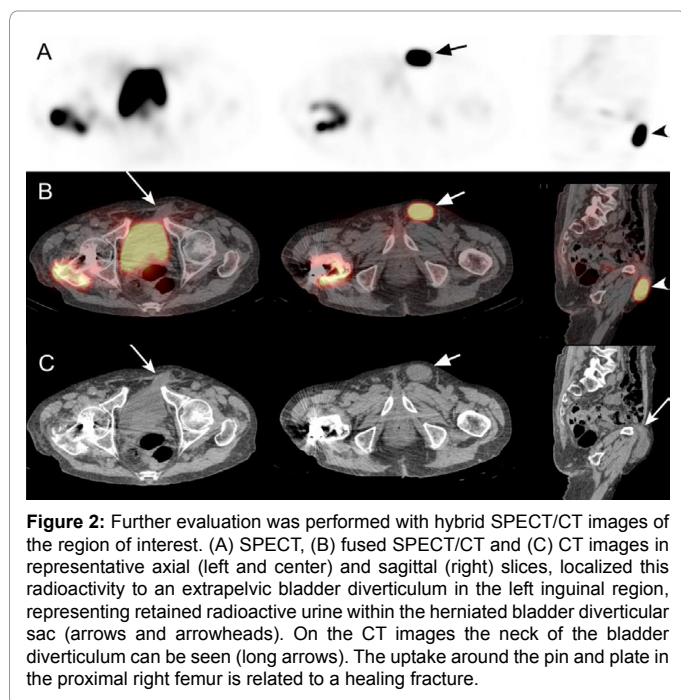
**Figure 1:** Following intravenous injection of 26.1 mCi [Tc99m]-methylene-diphosphonate (MDP) a 3-hour whole body sweep was performed. Anterior planar images (A) demonstrated irregular radiotracer uptake involving the proximal right femur particularly around the intratrochanteric region. There was intense uptake seen overlying and obscuring the left pubic symphysis (arrow) considered related to urinary contamination, due to the intensity being similar to that of the bladder. After removing the patient's trousers and washing the perineum and inguinal regions anterior planar images (B) and SPECT maximum intensity projection images (C) of the pelvis were obtained demonstrating persistent uptake at the left inguinal region, despite washing. Uptake related to the injection site at the left cubital fossa is noted (asterisk).

**\*Corresponding author:** Ka Kit Wong, Department of Radiology, University of Michigan, Medical Centre, USA, Tel: 734-936-5388; E-mail: [kakit@med.umich.edu](mailto:kakit@med.umich.edu)

**Received** July 21, 2015; **Accepted** August 22, 2015; **Published** August 29, 2015

**Citation:** Wong KK, Viglianti BL, Gross MD (2015) Inguinoscrotal Herniation of a Bladder Diverticulum on [Tc99m]-Methylene-Diphosphonate (MDP) Bone Scan Diagnosed with SPECT/CT. J Clin Case Rep 5: 580. doi:10.4172/2165-7920.1000580

**Copyright:** © 2015 Wong KK, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.



**Figure 2:** Further evaluation was performed with hybrid SPECT/CT images of the region of interest. (A) SPECT, (B) fused SPECT/CT and (C) CT images in representative axial (left and center) and sagittal (right) slices, localized this radioactivity to an extrapelvic bladder diverticulum in the left inguinal region, representing retained radioactive urine within the herniated bladder diverticular sac (arrows and arrowheads). On the CT images the neck of the bladder diverticulum can be seen (long arrows). The uptake around the pin and plate in the proximal right femur is related to a healing fracture.

herniation of urological origin are at risk for acute renal failure, bladder rupture, bladder cancer, vesico-cutaneous fistula and bladder calculi [5]. Surgical management may be difficult due to adhesions and risk of bladder injury, therefore if asymptomatic conservative management is favored. Strangulation of herniated bladder diverticulae is rare due to the large neck [1]. Initial evaluation of inguinal hernias is based on ultrasound evaluation and urological contents may be identified [6]. When urological contents are suspected clinically then cystoscopy and cystogram are invaluable. The gold standard is a cystogram which shows contrast within the bladder neck and diverticulum sac [1,3,7]. CT is a useful modality for confirming herniated bladder or bladder diverticulum, also providing information regarding the relationship of the contents to the epigastric vessels [2,4,8,9].

Many radionuclide studies have genitourinary excretion of radiotracer activity, therefore the presence of a herniated bladder diverticulum could lead to diagnostic difficulty. Intra-pelvic bladder diverticulae have been reported on bone scan [10,11], and inguinoscrotal herniation of a bladder diverticulum causing potential false-positive findings has been reported on bone scan [12] and FDG PET/CT [5]. To our knowledge this case is the first report of SPECT/CT in evaluation of inguinoscrotal herniation of a bladder diverticulum that was a potential mimic of pelvic bone metastasis. This diagnosis was suspected though difficult to confirm with standard planar and SPECT images, despite vigorous efforts to exclude skin contamination. Many authors have found SPECT/CT to be valuable for investigation of non-osseous radioactivity distributions on bone scan [13,14], and our case

provides evidence for utility in the diagnosis of urological contents that have herniated into the inguinal region.

## References

1. Tyler R, Vint R, Morton L (2013) Beware: the inguinoscrotal hernia with urological origins. *J Surg Case Rep*.
2. Izes BA, Larsen CR, Izes JK, Malone MJ (1993) Computerized tomographic appearance of hernias of the bladder. *J Urol* 149: 1002-1005.
3. Omari AH, Alghazo MA (2013) Urinary bladder diverticulum as a content of femoral hernia: a case report and review of literature. *World J Emerg Surg* 8: 20.
4. Fuerxer F, Brunner P, Cucchi JM, Mourou MY, Bruneton JN (2006) Inguinal herniation of a bladder diverticulum. *Clin Imaging* 30: 354-356.
5. Hinojosa D, Joseph UA, Wan DQ, Barron BJ (2008) Inguinal herniation of a bladder diverticulum on PET/CT and associated complications. *Clin Imaging* 32: 483-486.
6. Catalano O (1997) US evaluation of inguinoscrotal bladder hernias: report of three cases. *Clin Imaging* 21: 126-128.
7. Schewe J, Brands EH, Pannek J (2000) The inguinal bladder diverticulum: a rare differential diagnosis of hernias. *Int Urol Nephrol* 32: 255-256.
8. Andac N, Baltacioglu F, Tuney D, Cimsit NC, Ekinici G, et al. (2002) Inguinoscrotal bladder herniation: is CT a useful tool in diagnosis? *Clin Imaging* 26: 347-348.
9. Kramer BA, Minnis JG, Schwartz BF (2009) Large bladder diverticulum presenting as an inguinal hernia. *Can J Urol* 16: 4946-4947.
10. Farmer KD, Gellett LR, Vivian GC, Franklin K (2001) Bladder diverticulum simulating a pelvic metastasis on a Tc-99m HDP bone scan. *Clin Nucl Med* 26: 60-61.
11. Chang CP, Tsai CH, Chen JH, Sheu MH, Hsieh HJ, et al. (2005) Demonstration of large bladder diverticulum on bone scan. *Clin Nucl Med* 30: 276-277.
12. Iagaru A, Siegel ME (2006) Demonstration of a right inguinal hernia containing urinary bladder diverticulum on whole-body bone scan and pelvic CT. *Eur J Nucl Med Mol Imaging* 33: 234.
13. Gnanasegaran G, Cook G, Adamson K, Fogelman I (2009) Patterns, variants, artifacts, and pitfalls in conventional radionuclide bone imaging and SPECT/CT. *Semin Nucl Med* 39: 380-395.
14. Soundararajan R, Naswa N, Sharma P, Karunanithi S, Nazar AH, et al. (2013) SPECT-CT for characterization of extraosseous uptake of 99mTc-methylene diphosphonate on bone scintigraphy. *Diagn Interv Radiol* 19: 405-410.