

Diagnostic Imaging of Lower Urinary Tract Disease



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KEYWORDS

- Contrast cystography and urethrography • Ultrasonography • CT/MRI
- Urinary bladder • Urethra • Transitional cell carcinoma • Cystitis • Urolithiasis

KEY POINTS

- Diagnostic imaging of the lower urinary tract is commonly performed in small animal patients presented with urinary tract signs such as azotemia, hematuria, dysuria, stranguria, and pollakiuria.
- Ultrasonography is the modality of choice for the diagnosis of most disorders affecting the bladder and intra-abdominal portion of the urethra.
- Survey radiographs of the abdomen are useful in identifying radiopaque bladder or urethral calculi, gas within the urinary tract, and enlarged lymph nodes or bone metastases secondary to lower urinary tract neoplasia.
- Cystography and urethrography are especially useful in the evaluation of bladder or urethral rupture, abnormal communication with other organs, and lesions of the pelvic or penile urethra.
- Advanced diagnostic imaging is useful in assessing the ureterovesical junction, evaluating intrapelvic lesions, improving surgical planning, monitoring the size of known lesions associated with the urinary tract, and evaluating regional lymph nodes and osseous structures for metastases.

INTRODUCTION

Diagnostic imaging of the lower urinary tract is routinely performed in small animal practice. This article reviews the indications, imaging modalities used, and findings to be expected in common lower urinary tract diseases.

INDICATIONS

Indications for diagnostic imaging of the lower urinary tract overlap with indications for general abdominal imaging (eg, nonspecific clinical signs such as anorexia or

The author has nothing to disclose.

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abdominal pain and abnormal findings on abdominal palpation). Specific indications include azotemia, hematuria, dysuria, stranguria, pollakiuria, and abdominal trauma with suspicion of uroabdomen.

IMAGING MODALITIES AND TECHNIQUES USED FOR LOWER URINARY TRACT IMAGING

Survey Radiographs

As radiographic equipment is readily available in small animal practices as well as referral institutions, survey radiographs of the abdomen are commonly the first step used in the evaluation of patients presented with signs referable to the lower urinary tract.¹⁻⁴ They are useful in identifying radiopaque bladder or urethral calculi or gas within the urinary tract and in assessing a patient for enlarged lymph nodes or bone metastases secondary to lower urinary tract neoplasia.⁵⁻⁸ Other disorders of the lower urinary tract usually require additional imaging for diagnosis, although dystrophic mineralization, urethral thickening, or prostatomegaly may on occasion be visible in dogs with urinary tract neoplasia (see later discussion). Standard radiographic projections include lateral and ventrodorsal views. Care should be taken to always include the entire pelvis and perineal area to allow assessment of the pelvic urethra. In addition, ventrodorsal oblique views (**Fig. 1**) and in male dogs lateral views of the pelvis with the legs flexed forward (“lateral perineal views” or “butt shots”) may be needed to minimize superimposition of osseous structures, which may obscure urethral calculi (**Fig. 2**).

Normal findings

The normal urinary bladder is of homogenous fluid opacity, is variable in size and shape, and may be partially located within the pelvic canal. Intrapelvic location of the bladder may be noted, the significance of which is controversially discussed.^{9,10} The normal urethra is not visible on survey radiographs.⁴

Contrast Cystography and Urethrography

These procedures involve instillation of a positive and/or negative contrast agent into the urinary bladder and/or urethra.^{2,3,11-18} They have largely been replaced by abdominal ultrasound but are still indicated for certain conditions (see later discussion).

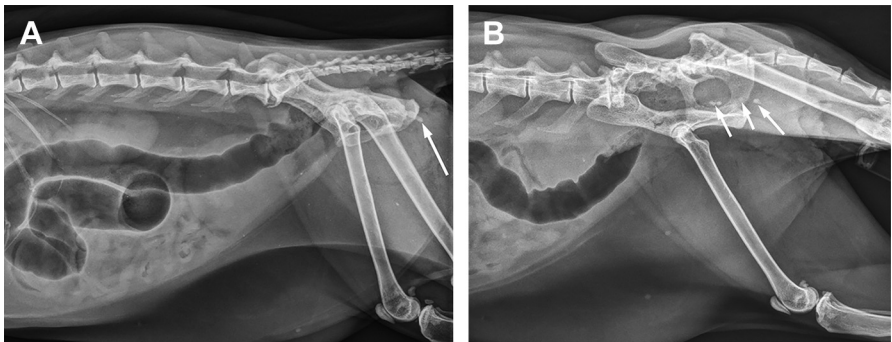


Fig. 1. Urethral calculi in a 13-year-old male castrated domestic shorthair cat. On the lateral view (A), an oblong mineral opacity is partially superimposed over the pelvis and extends into the plane of the perineal soft tissues (*arrow*). The oblique view of the pelvis (B) allows for identification of additional calculi in the intrapelvic part of the urethra (*arrows*). Mineralized sediment is present with the urinary bladder. Lumbo-sacral spondylosis deformans is incidental.

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