Urine Cytology

Collection, Film Preparation, and Evaluation

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KEYWORDS

• Transitional cell carcinoma • Urine collection • Bacteriuria • Voided • Cystocentesis • Culture

KEY POINTS

- Cytologic examination of the urine sediment in animals suspected of having urinary tract disease and/or lower urinary tract masses is one of the best means of distinguishing inflammation, infection, and neoplasia and it can help determine if a positive dipstick result for hemoglobin/blood is due to hemorrhage or blood contamination.
- The quality of the specimen collection and handling plays an important role in the quality of results, the validity of interpretations, and selection of appropriate course of action.
- The method of sample collection aids localization of pathology.
- Air dry, but do not heat fix, freeze, or expose films to formalin fumes, temperature extremes, or condensation.

INTRODUCTION

Urinalysis is an important part of the minimum database for routine health screens and is used as a means of monitoring response to treatment. Although a complete urinalysis provides a critical indication of renal function, acid-base homeostasis, and other body systems, the focus of this article is the cytologic examination of urine sediment for evidence of inflammation, infection, and/or neoplasia. It can also help determine if a positive dipstick result for hemoglobin/blood is due to hemorrhage or blood contamination. The specific method of sample collection can assist with localizing the source of pathology when interpreted with the cytologic findings. Images of urine sediment are included that illustrate common findings in these samples.

The authors have nothing to disclose.

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LABORATORY MEDICINE ROLE

Urine cytology continues to comprise largely manual microscopic methods. Much can be done with a quality microscope in the hands of experienced personnel. Digital imagery can be submitted to a clinical pathologist for further evaluation. A few recent developments, such as rapid manual tests for determining the presence and Gram-staining characteristics of bacteria and presence of transitional cell carcinoma complement the manual techniques. A recently marketed automated sediment analyzer claims the ability to evaluate urine for blood and epithelial cells, bacteria, casts, and common crystals.

CLINICAL PRESENTATION

Indications for cytologic evaluation of urine and the lower urinary tract include routine screening as part of the minimum database or a pursuit for an explanation of polydipsia, polyuria, pollakiuria, pain, discolored urine, dysuria, anorexia, and/or vomiting. Mass lesions or other abnormalities discovered by palpation or imaging in the bladder or distal urinary tract are other reasons for cytologic evaluation of this region. The risks of obtaining a urine or tissue samples are generally considered minimal and are related to the method of collection as provided in the tables.

SPECIMEN PROCUREMENT/TRACKING

As with most laboratory procedures, the quality of the specimen collection and handling plays an important role in the quality of results, validity of interpretations and therapeutic selections.[1] Urine collection containers should be clean, sterile, and constructed of nonbreakable, leak-proof material, such as plastic cups with a screw top lid commercially sold for this purpose. Syringes are acceptable when the samples are collected by cystocentesis or catheterization; however, it must be insured that the needle is snugly capped or replaced with a clean syringe cap to avoid sample contamination. Owners should be warned against using food or other reused containers because these may not be sterile and detergents can interfere with biochemical results. If there is a potential for zoonotic infectious agents, medical professionals should collect the sample using biosafety precautions and insure the specimen is properly labeled as potentially biohazardous.

The source of formed elements observed in urine varies with the method of collection. Collection options, selection criteria, advantages, and disadvantages are provided in **Boxes 1–3**.[2]

Voided, or free catch, specimens may be obtained by holding the collection receptacle near the urethral opening during micturition. This may be easier said than done but is feasible in many veterinary patients. Using a receptacle other than a bulky urine specimen cup can address problems collecting samples. Examples include a flat rectangular clean plastic container (Tupperware, for example) or a clean ladle spoon (recommended). The urine is then poured into the sterile urine specimen cup as soon as possible. Collapsible sticks or poles that hold the receptacle of choice in place allow owners to adjust the length so that the dog can urinate multiple feet away (as normal on a leash) and they can still catch the urine. If urine is voided onto the floor, it can be aspirated using a sterile syringe and needle but such samples are prone to significant contamination. Manual bladder expression is not recommended because this can induce trauma/discomfort to the patient, force bacterial organisms into other urogenital areas, and result in hemorrhage that complicates interpretation of the urinalysis (**Box 1**).