Canine Hip Dysplasia
Diagnostic Imaging

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KEYWORDS

• Hip-extended radiographs • Distraction radiography • Hip osteoarthritis
• Norberg angle • Computed tomography • MRI

KEY POINTS

- A properly positioned hip-extended radiograph is useful as a screening tool for hip dysplasia and for detection of osteoarthritis but may not adequately represent the degree of hip laxity.
- The caudal curvilinear osteophyte (Morgan line) and circumferential femoral head osteophyte represent 2 of the earliest signs of coxofemoral osteoarthritis.
- A PennHip distraction index of $\geq$0.3 in dogs $\geq$16 weeks of age is generally considered to indicate an increased risk of future osteoarthritis development.
- MRI modalities such as T2 mapping and dGEMRIC imaging allow for a more sensitive assessment of cartilage health.

INTRODUCTION

Imaging of the canine pelvis couple with physical exam findings are the principle methods used to screen for and diagnose canine hip dysplasia, especially when evaluating juvenile patients in the early course of the disease. Once the disease has progressed to a state of severe osteoarthritis, the ability to diagnose the condition becomes less complicated because the radiographic changes are more readily apparent. Many imaging modalities such as radiography, computed tomography (CT), ultrasound, and MRI can be used in the assessment of canine patients with hip dysplasia. These imaging modalities are used for the preliminary diagnosis of hip dysplasia as well as in the surveillance of disease progression and the evaluation of the success of treatment interventions. Each imaging modality has inherent

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advantages, disadvantages, and limitations. This article discusses the various imaging modalities and their utility with regard to canine hip dysplasia.

RADIOGRAPHY

Hip dysplasia is defined as radiographic evidence of joint laxity or signs of osteoarthritis, with hip laxity being the primary risk factor for osteoarthritis development.[1] Radiographs have been used for diagnosing hip dysplasia since the condition was first reported in 1935.[2] Numerous radiographic projections can be used to evaluate and screen patients. The most commonly reported techniques include hip-extended radiography, Norberg angle, distraction-stress radiographs, and the dorsal acetabular rim (DAR) view.

Hip-Extended Radiography

The ventrodorsal, hip-extended radiograph is the most commonly used radiographic projection for evaluating canine hips. Proper positioning for this view often requires heavy sedation and/or general anesthesia and is achieved by placing the animal in dorsal recumbency, extending the hind limbs caudally, and slightly internally rotating the femurs. A properly positioned radiograph should include a symmetric pelvis, parallel and fully extended femurs, and patellas that are centered within the femoral trochlea (**Fig. 1**A).[3] This radiographic position is the one most often used by screening organizations such as the Orthopedic Foundation for Animals (OFA), Fédération Cynologique Internationale, and the British Veterinary Association/Kennel Club. Common

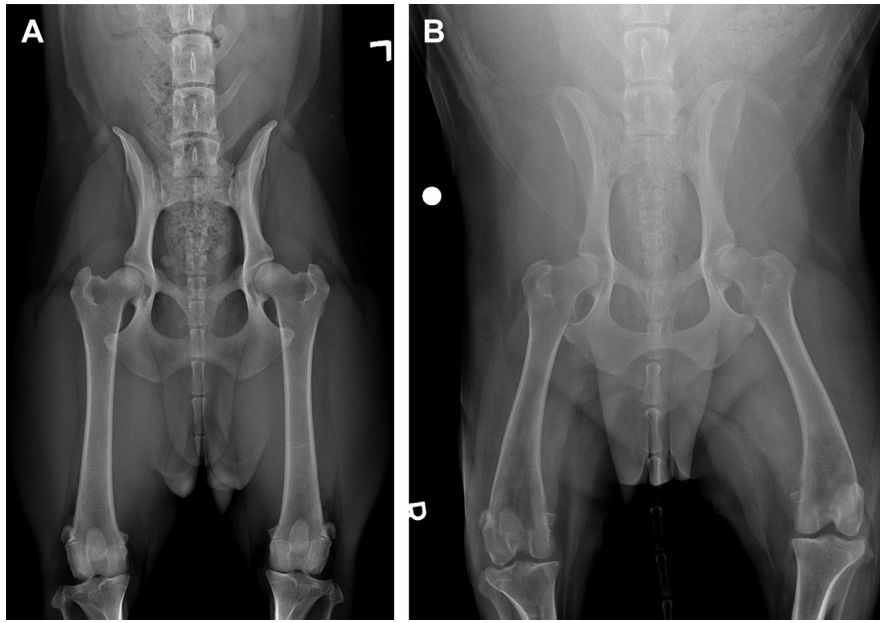

Fig. 1. (*A*) Properly positioned hip-extended radiographic view should include a symmetric pelvis, parallel and fully extended femurs, and patellas that are centered within the femoral trochlea. (*B*) Common errors in positioning include failure to fully extend and internally rotate the femurs.

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