Hip dysplasia is one of the most common orthopedic conditions in dogs. Although researchers continue to determine the best methods for predicting its development, it is important that veterinarians know how to evaluate dogs of all ages for the condition.

**IDENTIFYING HIP LAXITY**

Regardless of whether clinical signs are present, all dogs of predisposed breeds should be physically examined between 12 and 20 weeks of age for evidence of hip joint laxity, such as a positive Ortolani sign, which indicates a dog is at risk for development of osteoarthritis secondary to hip dysplasia.

An Ortolani test is performed with the dog in lateral recumbency. The examiner places the hip in a neutral position with the upper leg parallel to the table, then applies a proximally directed force against the stifle, driving the femur toward the pelvis. This encourages the femoral head to subluxate out of the acetabulum. The limb is then slowly abducted as the examiner feels and listens for a “clunk,” indicating reduction of the femoral head and confirming hip joint laxity.1

Unfortunately, a negative Ortolani test does not guarantee a healthy hip later in life. The Ortolani sign may not be present if degenerative changes have occurred, such as acetabular remodeling. In some cases, it may be difficult to elicit an Ortolani sign even if subluxation is present due to limited clinician experience or factors related to the dog, such as a puppy that is difficult to restrain.

Standard ventrodorsal radiographs provide valuable information regarding hip conformation, subluxation, and the presence of osteoarthritis. However, a more objective method for evaluating hip joint laxity is a PennHIP radiographic study, in which the hips are distracted during imaging; the resulting radiographs are used to measure a distraction index (DI).2-4 A DI of 0.7 or greater is associated with an increased risk of osteoarthritis development by 2 years of age.5 Standard extended limb ventrodorsal radiographs frequently do not show subluxation or secondary arthritic changes at this age, potentially delaying a diagnosis of hip laxity until arthritic changes are present. See **BOX 1** for additional resources on the radiographic evaluation of hip dysplasia.

**SURGICAL OPTIONS**

Dogs younger than 20 weeks with mild to moderate hip laxity may benefit from a juvenile pubic symphysiodesis (JPS), which stops pubic growth, resulting in ventrolateral rotation of the acetabula and better femoral head coverage as the pelvis continues to develop.2,6,7 JPS has been shown to be most effective at restoring hip congruity in puppies with a PennHIP DI of 0.4 to 0.6 (ideally < 0.5).7 To be of benefit, this procedure is best performed by 12 to 16 weeks of age as future potential growth is a requirement, highlighting the importance of early patient screening.

As all dogs continue to grow, they should be regularly examined for hip dysplasia, including a lameness exam, Ortolani test, and hip manipulation.8,9 Radiographs are recommended for dogs aged 5 to 10 months with hip...
joint laxity and clinical signs of hip dysplasia (e.g., lameness, bunny hopping, gait abnormalities, pain on manipulation). Again, PennHIP radiographs are recommended, but extended limb ventrodorsal radiographs may give information regarding hip laxity and secondary arthritic changes. If a dog of this age has subluxation on ventrodorsal hip–extended radiographs, but there is still contact between the femoral head and acetabulum and the hip angle of subluxation (a measure of femoral head coverage by the acetabulum) is less than 30°, a double pelvic osteotomy (DPO) or triple pelvic osteotomy (TPO) may be considered.

These DPO and TPO procedures change the position of the acetabulum to provide more femoral head coverage; they are not meant for dogs that have severe subluxation or degenerative changes present on radiographs.

For dogs that are older than 10 months, that have degenerative joint disease or severe subluxation, or whose owners have financial limitations, conservative management is instituted. This may include weight loss, exercise modification, physical therapy, nonsteroidal anti-inflammatory drugs, chondroprotective agents, or other treatments.

If conservative treatments have been exhausted and clinical response is not satisfactory, surgical salvage procedures such as total hip replacement, hip denervation, or femoral head and neck excision can be considered.

**BOX 1 Suggested Resources**

- PennHIP online training
  info.antechimagingservices.com/pennhip/online-training
- Orthopedic Foundation for Animals
  ofa.org/diseases/hip-dysplasia/hip-grade-details

Have you, or has someone you know, made a profound difference in the veterinary profession?

Nominate someone today!

Learn more at NAVC.com/Gives
Clinical signs of hip dysplasia (e.g., bunny hopping, pain on hip extension, swaying gait, muscle atrophy, exercise intolerance)?

- No
  - Evaluate for hip dysplasia:
    - Lameness examination
    - Ortolani test
    - Hip manipulation
  - If patient has any of the following risk factors, reevaluate at 1-month intervals:
    - Predisposed breed, especially with genetic history
    - Positive Ortolani test result
    - Suspected hip laxity based on previous radiographs
  - Perform PennHIP study (preferred), extended limb ventrodorsal radiographs may be taken
    - Normal DI for breed:
      - Conservative management
    - Mild to moderate DI:
      - JPS
    - Moderate to severe DI:
      - Dog aged 5-12 months: TPO or DPO
      - Dog aged 3-5 months: JPS

- Yes
  - Dogs aged 3-5 months
    - Perform Ortolani test
      - Negative result
        - Evaluate for other causes of clinical signs
        - If no other cause found, perform PennHIP study or extended limb ventrodorsal radiographs
      - Positive result
        - If present, treat accordingly
    - Dogs aged 5-12 months: Perform Ortolani test
      - Negative result
        - Evaluate for other causes of clinical signs
        - If no other cause found, perform PennHIP study or extended limb ventrodorsal radiographs
      - Positive result
        - If present, treat accordingly
  - Dogs aged 5-12 months:
    - Clinical signs, severe subluxation, or OA:
      - Conservative management; consider THR or FHO if inadequate response after 10 months of age
    - Clinical signs, subluxation, and no OA:
      - TPO or DPO
  - Dogs aged <12 months
    - Clinical signs of hip dysplasia (e.g., bunny hopping, pain on hip extension, swaying gait, muscle atrophy, exercise intolerance)?
      - No
        - Evaluate for hip dysplasia:
          - Lameness examination
          - Ortolani test
          - Hip manipulation
        - If patient has any of the following risk factors, reevaluate at 1-month intervals:
          - Predisposed breed, especially with genetic history
          - Positive Ortolani test result
          - Suspected hip laxity based on previous radiographs
        - Perform PennHIP study (preferred), extended limb ventrodorsal radiographs may be taken
          - Normal DI for breed:
            - Conservative management
          - Mild to moderate DI:
            - JPS
          - Moderate to severe DI:
            - Dog aged 5-12 months: TPO or DPO
            - Dog aged 3-5 months: With DJD or OA, conservative management; reevaluate for THR, denervation, or FHO once skeletally mature
      - Yes
        - Dogs aged 3-5 months
          - Perform Ortolani test
            - Negative result
              - Evaluate for other causes of clinical signs
              - If no other cause found, perform PennHIP study or extended limb ventrodorsal radiographs
            - Positive result
              - If present, treat accordingly
          - Dogs aged 5-12 months: Perform Ortolani test
            - Negative result
              - Evaluate for other causes of clinical signs
              - If no other cause found, perform PennHIP study or extended limb ventrodorsal radiographs
            - Positive result
              - If present, treat accordingly
  - Dogs aged <12 months
    - Clinical signs of hip dysplasia (e.g., bunny hopping, pain on hip extension, swaying gait, muscle atrophy, exercise intolerance)?
      - No
        - Evaluate for hip dysplasia:
          - Lameness examination
          - Ortolani test
          - Hip manipulation
        - If patient has any of the following risk factors, reevaluate at 1-month intervals:
          - Predisposed breed, especially with genetic history
          - Positive Ortolani test result
          - Suspected hip laxity based on previous radiographs
        - Perform PennHIP study (preferred), extended limb ventrodorsal radiographs may be taken
          - Normal DI for breed:
            - Conservative management
          - Mild to moderate DI:
            - JPS
          - Moderate to severe DI:
            - Dog aged 5-12 months: TPO or DPO
            - Dog aged 3-5 months: With DJD or OA, conservative management; reevaluate for THR, denervation, or FHO once skeletally mature
      - Yes
        - Dogs aged 3-5 months
          - Perform Ortolani test
            - Negative result
              - Evaluate for other causes of clinical signs
              - If no other cause found, perform PennHIP study or extended limb ventrodorsal radiographs
            - Positive result
              - If present, treat accordingly
          - Dogs aged 5-12 months: Perform Ortolani test
            - Negative result
              - Evaluate for other causes of clinical signs
              - If no other cause found, perform PennHIP study or extended limb ventrodorsal radiographs
            - Positive result
              - If present, treat accordingly
Mature dogs with clinical signs of hip pain/dysplasia and/or lameness

Evaluate for other causes of lameness and pain, such as cranial cruciate ligament disease or neurologic problems

If no other cause found, obtain hip radiographs

Mild to no signs of hip dysplasia

Use other diagnostic modalities (ultrasonography, computed tomography, magnetic resonance imaging) to evaluate for neurologic or muscular disease

Positive results: Treat accordingly
Negative results: Conservative management

Moderate or severe signs of hip dysplasia

Conservative management

Positive response: Continue conservative management
Negative response (clinical signs still present): Consider the following options:
- THR
- Denervation
- FHO

DI = distraction index; DJD = degenerative joint disease; DPO = double pelvic osteotomy; FHO = femoral head ostectomy; JPS = juvenile pubic symphysiodesis; OA = osteoarthritis; THR = total hip replacement; TPO = triple pelvic osteotomy

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Jessica is the orthopedics technician at UT’s Veterinary Medical Center, where she teaches technical skills and mentors fourth-year veterinary students. Over the past 6 years, she has also supervised and trained first- through third-year veterinary students to be assistants for the small animal surgical emergency team. Patient care and educating veterinary students are her passions. She also has a strong interest in surgery and recently obtained her VTS credential in surgery. Some of her favorite orthopedic procedures are total hip replacement, external fixation, and all coaptations.

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Dr. Tobias is a graduate of the University of Illinois College of Veterinary Medicine. She completed an internship at Purdue University and a surgical residency and master’s degree at the Ohio State University. Dr. Tobias has served as a clinical instructor at the University of Georgia and a tenured faculty member at Washington State University and is currently a professor of small animal surgery at UT’s College of Veterinary Medicine. Dr. Tobias is an author or coauthor and editor of 3 textbooks and has authored more than 100 peer-reviewed publications.

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Dr. Millis received his BS and DVM degrees from Cornell University and his MS degree from the University of Florida. He completed an internship and surgery residency at Michigan State University, where he also completed a residency for the American College of Veterinary Surgery. He is currently an assistant professor of orthopedic surgery at the University of Florida. He completed an internship and a surgical residency at Cornell University and his MS degree from the Washington State University. He is currently a professor at Utah’s College of Veterinary Medicine. He is also a medical director of the CARES surgery residency at Michigan State University. He has also completed a residency for the American College of Veterinary Surgery.

References