

ORTHOPEDICS

Canine Hip Dysplasia: When to Refer for Surgery

Cassio Ferrigno, DVM, MS, PhD

Jessica Wiley Montoya, AAS, LVMT, CCRP, VTS (Surgery)

Karen M. Tobias, DVM, MS, DACVS

Darryl Millis, DVM, DACVS, DACVSMR

University of Tennessee College of Veterinary Medicine, Knoxville, Tennessee

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)¹⁰ or triple pelvic osteotomy (TPO)¹¹ 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.¹²

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.^{13,14}

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.¹⁵⁻²¹

BOX 1 Suggested Resources

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

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

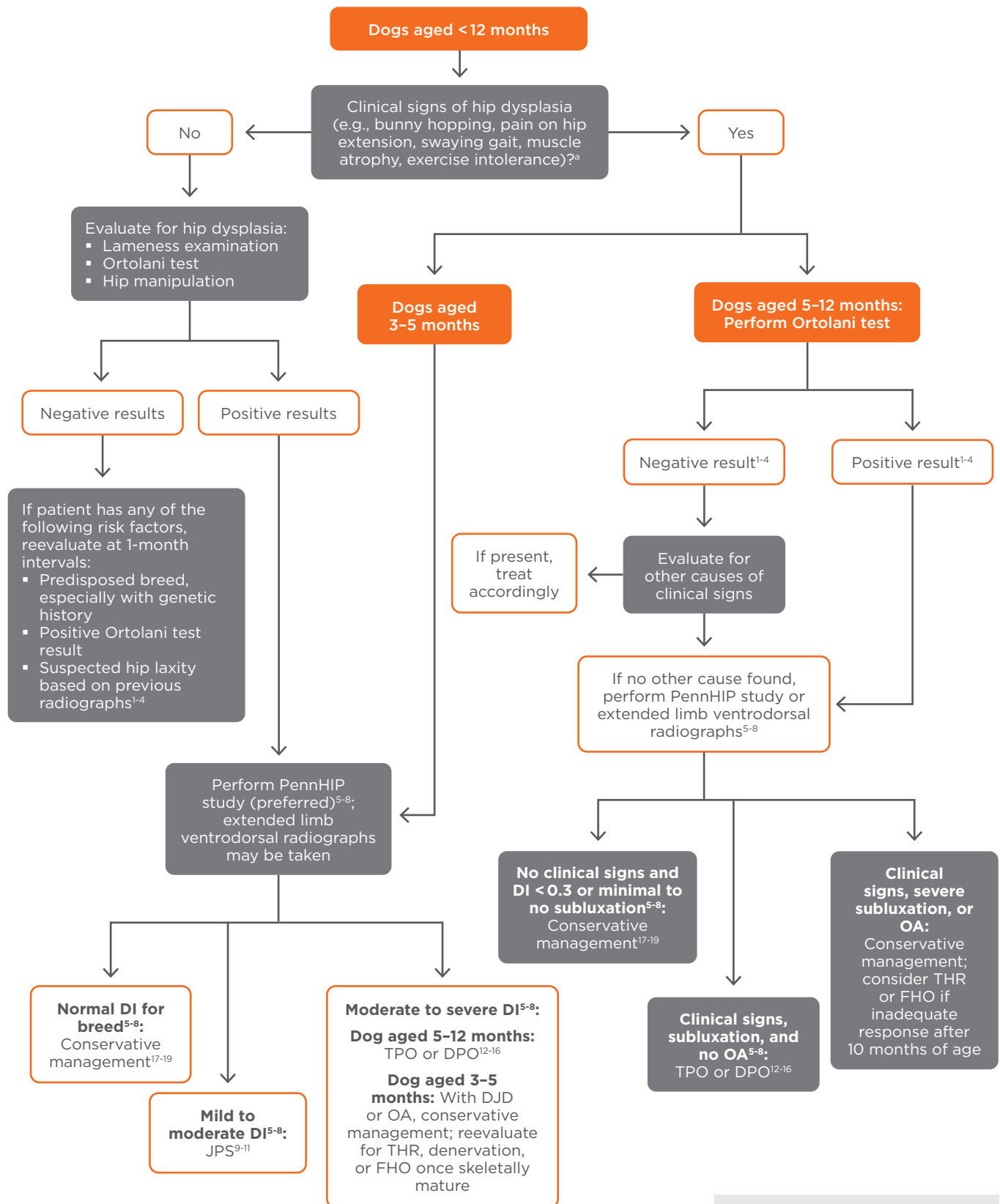


Nominate someone today!

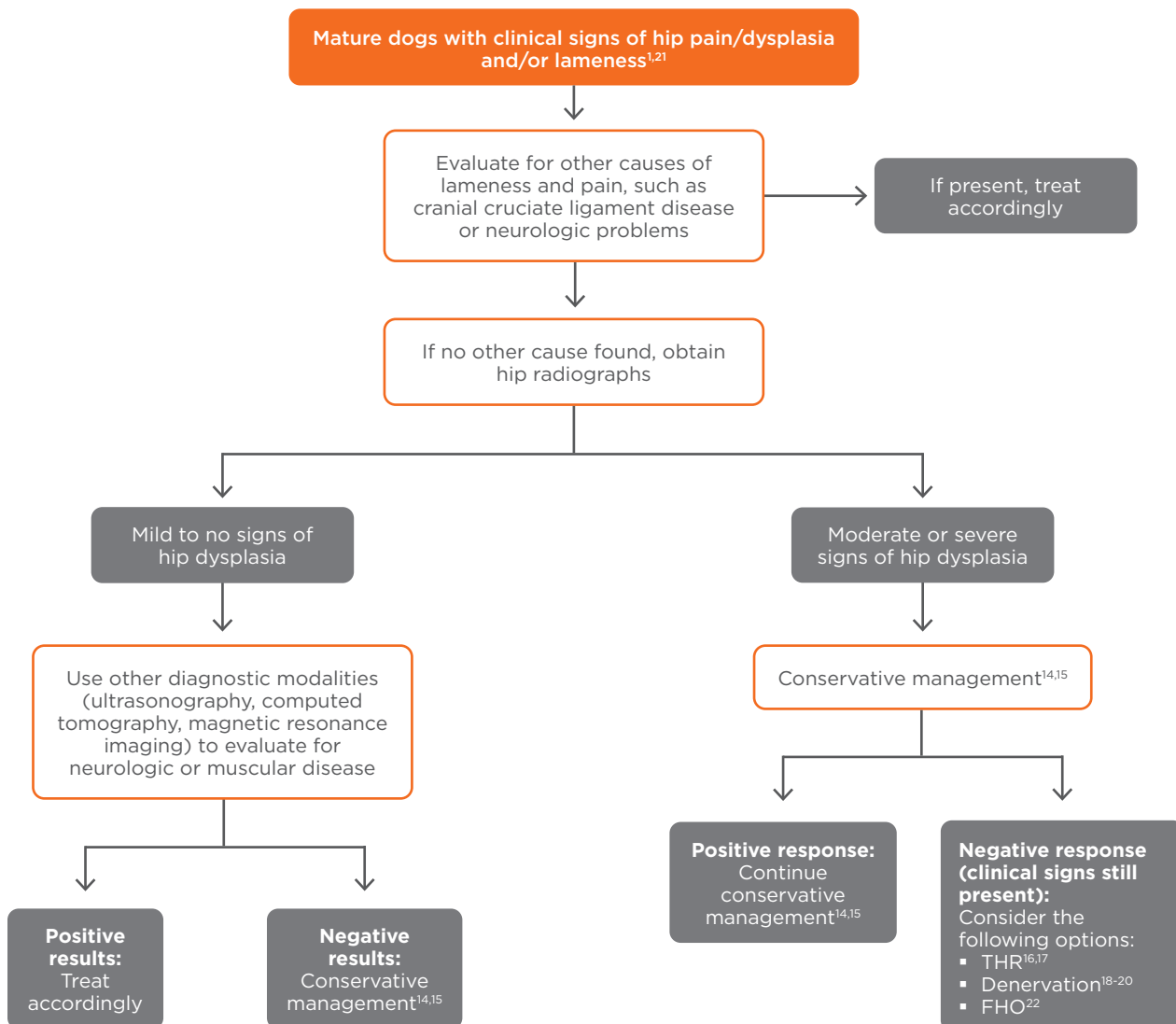
Learn more at
NAVC.com/Gives



NAVC Gives
Helping the Veterinary Community Thrive



^aMost dogs aged 3 to 5 months will have no clinical signs.



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



Cassio Ferrigno

Dr. Ferrigno was born and raised in São Paulo, Brazil. He earned his degree in veterinary medicine from the Universidade Estadual Paulista Júlio de Mesquita Filho; his master's degree in clinical veterinary surgery from the University of São Paulo (USP); his PhD degree in clinical veterinary surgery from USP; and a postdoctorate degree at the University of Florida, 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 Tennessee (UT). Dr. Ferrigno's research focus is advancing the field of small animal orthopedics with emphasis in biomechanics and new implants.



Jessica Wiley Montoya

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.



Karen M. Tobias

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.



Darryl Millis

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. He is a professor of orthopedic surgery at UT's College of Veterinary Medicine, the director of the CARES Center for Veterinary Sports Medicine, and a primary faculty member of the UT Certificate Program in Canine Rehabilitation. He is also past president of the International Association of Veterinary Rehabilitation and Physical Therapy and the founder of **mylamedog.com** and **mylamedogsvet.com**, online resources regarding common orthopedic conditions. He is the author of over 60 publications, 80 textbook chapters, and 110 abstracts/proceedings.



References

1. Ginja MMD, Silvestre AM, Gonzalo-Orden JM, Ferreira AJA. Diagnosis, genetic control and preventive management of canine hip dysplasia: a review. *Vet J*. 2010;184(3):269-276. doi:10.1016/j.tvjl.2009.04.009
2. Dueland RT, Adams WM, Patricelli AJ, Linn KA, Crump PM. Canine hip dysplasia treated by juvenile pubic symphysiodesis. Part I: two year results of computed tomography and distraction index. *Vet Comp Orthop Traumatol*. 2010;23(5):306-317. doi:10.3415/VCOT-09-04-0045
3. Guillard M. The PennHIP method of predicting canine hip dysplasia. *In Pract*. 2014;36(2):66-74. <https://doi.org/10.1136/inp.f7486>
4. Worth AJ, Laven RA, Erceg VH. An assessment of the agreement between the New Zealand veterinary association hip dysplasia scoring system and the PennHIP distraction index in German shepherd dogs. *N Z Vet J*. 2009;57(6):338-345. doi:10.1080/00480169.2009.64720
5. Klever J, Brühshwein A, Wagner S, Reese S, Meyer-Lindenberg A. Comparison of reliability of Norberg angle and distraction index as measurements for hip laxity in dogs. *Vet Comp Orthop Traumatol*. 2020;33(4):274-278. doi:10.1055/s-0040-1709460
6. Dueland RT, Patricelli AJ, Adams WM, Linn KA, Crump PM. Canine hip dysplasia treated by juvenile pubic symphysiodesis. Part II: two year clinical results. *Vet Comp Orthop Traumatol*. 2010;23(5):318-325. doi:10.3415/VCOT-09-04-0040
7. Vezzoni A, Dravelli G, Vezzoni L, et al. Comparison of conservative management and juvenile pubic symphysiodesis in the early treatment of canine hip dysplasia. *Vet Comp Orthop Traumatol*. 2008;21(3):267-279.
8. Riser WH, Shirer JF. Hip dysplasia: coxofemoral abnormalities in neonatal German shepherd dogs. *J Small Anim Pract*. 1966;7(1):7-12. doi:10.1111/j.1748-5827.1966.tb04372.x
9. Gold RM, Gregor TP, Huck JL, McKelvie PJ, Smith GK. Effects of osteoarthritis on radiographic measures of laxity and congruence in hip joints of Labrador retrievers. *JAVMA*. 2009;234(12):1549-1554. doi:10.2460/javma.234.12.1549
10. Petazzoni M, Tamburro R. Clinical outcomes of double pelvic osteotomies in eight dogs with hip dysplasia aged 10-28 months. *Vet Surg*. 2022;51(2):320-329. doi:10.1111/vsu.13737
11. Petazzoni M, Tamburro R, Nicetto T, Kowaleski MP. Evaluation of the dorsal acetabular coverage obtained by a modified triple pelvic osteotomy (2.5 pelvic osteotomy): an ex vivo study on a cadaveric canine model. *Vet Comp Orthop Traumatol*. 2012;25(5):385-389. doi:10.3415/VCOT-11-08-0109
12. Janssens LAA, Daems R, Pillin L, Vandekerckhove P, Van Dongen S. Triple pelvic osteotomy with a 12.5° and a 20° Slocum-type plate: a short-term prospective clinical pilot study in 38 dogs. *Vet Surg*. 2020;49(7):1449-1457. doi:10.1111/vsu.13471
13. Johnston SA. Conservative and medical management of hip dysplasia. *Vet Clin North Am Small Anim Pract*. 1992;22(3):595-606. doi:10.1016/S0195-5616(92)50058-4
14. Dycus DL, Levine D, Marcellin-Little DJ. Physical rehabilitation for the management of canine hip dysplasia. *Vet Clin North Am Small Anim Pract*. 2017;47(4):823-850. doi:10.1016/j.cvs.2017.02.006
15. Liska WD, Israel SK. Morbidity and mortality following total hip replacement in dogs. *Vet Comp Orthop Traumatol*. 2018;31(3):218-221. doi:10.1055/s-0038-1632365
16. Denny HR, Linnell M, Maddox TW, Comerford EJ. Canine total hip replacement using a cementless threaded cup and stem: a review of 55 cases. *J Small Anim Pract*. 2018;59(6):350-356. doi:10.1111/jsap.12827
17. Schmaedecke A, Saut JPE, Ferrigno CRA. A quantitative analysis of the nerve fibres of the acetabular periosteum of dogs. *Vet Comp Orthop Traumatol*. 2008;21(5):413-417.
18. Ferrigno CRA, Schmaedecke A, Ferraz VCM. A new surgical approach to acetabular denervation in dogs. *Pesqui Vet Bras*. 2007;27(2):61-63.
19. Ferrigno CRA, Schmaedecke A, Oliveira LM, D'Ávila RS, Yamamoto EY, Saut JPE. Cranial and dorsal acetabular denervation technique in treatment of hip dysplasia in dogs: 360 days evaluation of 97 cases. *Pesqui Vet Bras*. 2007;27(8):333-340. <https://doi.org/10.1590/S0100-736X2007000800003>
20. Davis KN, Hellyer PW, Carr ECJ, Wallace JE, Kogan LR. Qualitative study of owner perceptions of chronic pain in their dogs. *JAVMA*. 2019;254(1):88-92. doi:10.2460/javma.254.1.88
21. Winders CLB, Vaughn WL, Birdwhistell KE, Holsworth IG, Franklin SP. Accuracy of femoral head and neck excision via a craniolateral approach or a ventral approach. *Vet Comp Orthop Traumatol*. 2018;31(2):102-107. doi:10.3415/VCOT-17-07-0099