Variation in O.F.A. Grade in Dogs with Unilateral or Bilateral Coxofemoral Subluxation

Introduction

Founded in 1966 by John Olin, the Orthopedic Foundation for Animals (O.F.A) was initially created as a result of Olin's concern about hip dysplasia in his hunting dogs[1]. As the name suggests, the Foundation originally focused on the screening of dogs (working, show and breeding) for hip dysplasia. The O.F.A. has since expanded to include additional databases such elbow dysplasia, cardiac and thyroid clearances as well as several breed-specific diseases, however, the primary focus remains on hip dysplasia. The O.F.A. is widely used by dog breeders and fanciers. I began doing O.F.A hip radiographs more than thirty years ago and over the past five years have averaged 300 to 400 evaluations annually.*

According to the application form (Figure 1), as well as their website, the O.F.A's recommendations for positioning suggest the dog be in "dorsal recumbency with the rear legs extended and parallel to each other……Care should be exercised to be sure the pelvis is not tilted[1]." Once a film is taken, it is sent to the O.F.A. office in Columbia, Missouri. There the radiologist on staff evaluates the film for diagnostic quality. If the radiologist deems it to be acceptable, the film is then sent on to three other consulting radiologists. Each radiologist evaluates the submitted radiograph for deviations from the accepted normal hip formation consisting of nine different anatomical areas of the hip joint. Final passing grades can include fair, good or excellent, while failing grades are borderline, mild, moderate and severe. Reasons for failure can include, but are not limited to, subluxation, remodeling of the femoral neck and/or head, osteoarthritis/degenerative joint disease or shallow acetabula.

In the late 1970's I began noticing discrepancies in radiographs taken at other animal hospitals which were read and graded by the O.F.A. as compared to the grade when I retook the radiograph and resubmitted the new film for grading.

Recently, I found that dogs with failing grades of subluxation, either unilaterally or bilaterally, as the only finding went on to get passing grades in 25 of 27 cases (92.59%) when I retook and resubmitted the

*2005=347; 2006=410; 2007=338; 2008=294; 2009=317

1

Figure 1- Standard Hip Extended VD Pelvis View as shown on the O.F.A. Hip Dysplasia Application Form

Instructions for Taking Films for OFA Dysplasia Evaluations

Radiographs should be permanently identified in the film emulsion with:

1. Registered name and/or number
2. Name of veterinarian or hospital making the film
3. Date of radiograph taken

• Pelvic evaluation are based on the standard VD view with good pelvic definition, pelvis not tilted and femurs extended and parallel

• Elbow evaluations are based on the standard flexed medial to lateral view
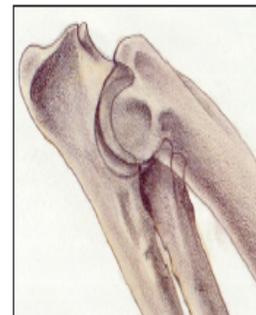
films. All 27 of 27 (100%) increased at least one grade.

This case study is based on a retrospective survey of a portion of my Orthopedic Foundation for Animals (O.F.A.) hip evaluation patients/clients from January, 2003 to May, 2009. The survey was sent to clients who came to me for O.F.A. retake/resubmit radiographs after having previously submitted a radiograph to the O.F.A. for evaluation and grading. The survey assured the owners of anonymity and was coded in order to identify the dog in the event verification is required.

Clinical Report

Following, you will find the survey, tabulated data from my survey, and a targeted review of all dogs that failed O.F.A. with subluxation as the only reason for a failing grade (bilateral or unilateral).

This population study will be assessed later in this paper.

See Tables 1, 1a, 2, 3, 4 and 5 to get an understanding of the method and the data acquired from my survey.

The majority of my O.F.A. patients are radiographed awake. If chemical restraint is necessary, I use dexmedetomidine hydrochloride[a] at a twenty-five percent reduced dose. I use a radiolucent positioning device to keep the dog comfortable and to avoid tilting. This device allows me to do a better job of getting the pelvis flat and symmetrical. The patellas are rotated medially so the patella is on the mid-line of the femur or medial to the mid-line. I position the femurs parallel to each other. To achieve this, I seemingly exaggerate the position by almost having the medial femoral condyles touch. I have found this technique actually produces nearly parallel femurs.

Ultimately, the goal when doing hip radiographs for the O.F.A. is to have the obturator foramen as close to symmetrical as possible, the patellas on the mid-line, the femurs parallel with the heads of the femurs having bilaterally symmetrical depth.

When this goal is achieved, whether the radiograph is submitted using physical restraint or chemical/anesthetic restraint, the film will reflect the dog's true structure—not the skill of the radiographer.

Please look closely at the printouts of radiographs which were brought to me by clients wishing to have their dog's hip radiographs redone and resubmitted by me. (Figures 2 and 3)

Figure 2 is the original radiograph of a Golden Retriever done at another veterinary clinic that was

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Table 1----Survey Questionnaire

Resubmission Data

Breed of dog _____

Previous OFA official rating _____
        OFA findings/comments :

□ subluxation	□ remodeling of femoral head/neck
□ osteoarthritis/degenerative joint disease	□ shallow acetabula
□ acetabular rim/edge change	□ unilateral pathology ___left ___right
□ transitional vertebra	□ spondylosis
□ panosteitis	□ other _____

        Dog/bitch was: a) awake □   b) sedated □   c) under general anesthesia (gas anesthetic) □

        Film was done: a) by xxxxxxxxxxxx □   b) at another veterinary clinic □

OFA official rating after retake by xxxxxxxxxxxxxxxxx _____
        OFA findings/comments :

□ subluxation	□ remodeling of femoral head/neck
□ osteoarthritis/degenerative joint disease	□ shallow acetabula
□ acetabular rim/edge change	□ unilateral pathology ___left ___right
□ transitional vertebra	□ spondylosis
□ panosteitis	□ other _____

        Dog/bitch was: a) awake □   b) sedated □   c) under general anesthesia (gas anesthetic) □

Your Viewpoint on My Technique

1) My technique was:
      Good   □
      Bad   □
      Ugly   □

      Rating on a scale of 0 - 10   0 1 2 3 4 5 6 7 8 9 10
                                     Really Bad   Fabulous

   Your comments:

2) Would you refer others to me?
      Yes □
      Yes, I already have □
      No □
      Maybe □

What suggestions would you make to improve the level of service we provide?

Table 1a-Potential Data Pool

Number of surveys sent:	93 clients	105 dogs
Information unavailable (letter returned)	2 clients	2 dogs
Number of responses:		53 dogs

Table 2—Full Data Report

No.	Breed	Previous Grade	Off or Prelim?	OFA Comments		New Grade	
1	Golden Retriever	borderline	official	subluxation	awake	good	awake
	" " (same dog)	fair	official		sedated		
2	Kuvasz	fair	prelim		awake	excellent	awake
3	Golden Retriever	mild dysplasia	official	subluxation	awake	good	awake
4	Golden Retriever	mild dysplasia	official	subluxation	awake	good	awake
5	Labrador Retriever	mild dysplasia	official	subluxation	sedated	fair	awake
6	Labrador Retriever	fair	official		sedated	good	sedated
7	Brittany Spaniel	fair	official		sedated	good	awake
8	Labrador Retriever	mild dysplasia	official	subluxation	sedated	good	awake
9	Golden Retriever	good	prelim			excellent	awake
10	Rottweiler	fair	official		awake	fair	awake
11	Golden Retriever	good	prelim		awake	good	awake
12	Golden Retriever	good	prelim		awake	good	awake
13	Golden Retriever	fair	official		sedated	good	sedated
14	Shetland Sheepdog	(fail)	official	subluxation	sedated	fair	awake
*15	Gordon Setter		prelim		awake	good	awake
16	Rottweiler	(fail)	official	subluxation	sedated	fair	awake
17	Golden Retriever	good	prelim		awake	good	awake
18	Labrador Retriever	good	prelim		awake	good	awake
19	Mastiff	good	official		sedated	excellent	awake
20	Golden Retriever	good	prelim			good	awake
21	Briard	fair	official		sedated	good	awake
22	Golden Retriever	fair	prelim		awake	good	awake
23	Golden Retriever	(fail)	official	subluxation	sedated	fair	awake
24	Labrador Retriever		official	subluxation	sedated	good	awake
25	Rottweiler	moderate dysplasia	official	subluxation	sedated	mild dysplasia	awake
26	Standard Schnauzer	mild dysplasia	official	subluxation	sedated	good	awake
27	Rhodesian Ridgeback	excellent	prelim		awake	good	sedated
28	Bernese Mountain Dog		official	subluxation	sedated	fair	awake
29	Golden Retriever	mild dysplasia	official	subluxation	sedated	fair	awake
30	Golden Retriever	good	prelim			good	awake
31	Golden Retriever	mild dysplasia	official	subluxation	sedated	fair	awake
32	Golden Retriever	moderate dysplasia	official	subluxation	sedated	good	awake
33	Labrador Retriever	mild dysplasia	official	remodeling	awake	fair	awake
34	Golden Retriever	moderate dysplasia	official	subluxation	sedated	mild dysplasia	awake
35	Golden Retriever	borderline	official	subluxation	sedated	good	awake
				shallow acetabula			
36	Golden Retriever	fair	official		sedated	good	awake
37	Golden Retriever	borderline	official	subluxation	sedated	good	awake
38	Cardigan Welsh Corgi	mild dysplasia	official	remodeling	sedated	mild dysplasia	awake
				transitional vertebra			

6

39	English Springer Spaniel	mild dysplasia	official	subluxation	sedated	excellent	awake
40	Golden Retriever		official	subluxation	sedated	fair	awake
41	Golden Retriever		official	osteoarthritis	sedated	good	awake
42	Golden Retriever	fair	official		sedated	good	awake
43	Bullmastiff	mild dysplasia	official	subluxation	sedated	fair	awake
44	Golden Retriever	mild dysplasia	official	subluxation		good	awake
45	Golden Retriever	fair	prelim		awake	good	awake
46	Golden Retriever	mild dysplasia	official	subluxation	sedated	good	awake
47	Golden Retriever	mild dysplasia	prelim			good	awake
48	Ches. Bay Retriever	fair	official		sedated	fair	awake
49	Afghan Hound	mild dysplasia	official	subluxation	sedated	fair	sedated
50	Rottweiler	mild dysplasia	official	subluxation	sedated	fair	awake
51	Golden Retriever	mild dysplasia	official		awake	good	awake
52	Labrador Retriever	mild dysplasia	official	subluxation	sedated	good	awake
				shallow acetabula			
53	German Shepherd	mild dysplasia	official	subluxation	sedated	fair	awake

Table 3- Change on O.F.A. Grade in Subluxation Only-Failing Original vs Resubmission O.F.A. Grade

No.	Breed	Previous Grade	Off or Prelim?	OFA Comments		New Grade	
1	Golden Retriever	borderline	official	subluxation	awake	good	awake
	" " (same dog)	fair	official		sedated		
3	Golden Retriever	mild dysplasia	official	subluxation	awake	good	awake
4	Golden Retriever	mild dysplasia	official	subluxation	awake	good	awake
5	Labrador Retriever	mild dysplasia	official	subluxation	sedated	fair	awake
8	Labrador Retriever	mild dysplasia	official	subluxation	sedated	good	awake
14	Shetland Sheepdog	(fail)	official	subluxation	sedated	fair	awake
16	Rottweiler	(fail)	official	subluxation	sedated	fair	awake
23	Golden Retriever	(fail)	official	subluxation	sedated	fair	awake
*24	Labrador Retriever		official	subluxation	sedated	good	awake
25	Rottweiler	moderate dysplasia	official	subluxation	sedated	mild dysplasia	awake
26	Standard Schnauzer	mild dysplasia	official	subluxation	sedated	good	awake
*28	Bernese Mountain Dog		official	subluxation	sedated	fair	awake
29	Golden Retriever	mild dysplasia	official	subluxation	sedated	fair	awake
31	Golden Retriever	mild dysplasia	official	subluxation	sedated	fair	awake
32	Golden Retriever	moderate dysplasia	official	subluxation	sedated	good	awake
34	Golden Retriever	moderate dysplasia	official	subluxation	sedated	mild dysplasia	awake
35	Golden Retriever	borderline	official	subluxation	sedated	good	awake
				shallow acetabula			
37	Golden Retriever	borderline	official	subluxation	sedated	good	awake
39	English Springer Spaniel	mild dysplasia	official	subluxation	sedated	excellent	awake
*40	Golden Retriever		official	subluxation	sedated	fair	awake
43	Bullmastiff	mild dysplasia	official	subluxation	sedated	fair	awake
44	Golden Retriever	mild dysplasia	official	subluxation		good	awake
46	Golden Retriever	mild dysplasia	official	subluxation	sedated	good	awake
49	Afghan Hound	mild dysplasia	official	subluxation	sedated	fair	sedated
50	Rottweiler	mild dysplasia	official	subluxation	sedated	fair	awake
52	Labrador Retriever	mild dysplasia	official	subluxation	sedated	good	awake
				shallow acetabula			
53	German Shepherd	mild dysplasia	official	subluxation	sedated	fair	awake

Table 4– Degree of Change– Subluxation Only vs. Resubmission

No.	Breed	Previous Grade	New Grade	Grades Changed
1	Golden Retriever	borderline	good	+ 2
	" " (same dog)	fair		+1
3	Golden Retriever	mild dysplasia	good	+3
4	Golden Retriever	mild dysplasia	good	+3
5	Labrador Retriever	mild dysplasia	fair	+2
8	Labrador Retriever	mild dysplasia	good	+3
14	Shetland Sheepdog	(fail)**	fair	+1 (at least)
16	Rottweiler	(fail)**	fair	+1 (at least)
23	Golden Retriever	(fail)**	fair	+1 (at least)
24	Labrador Retriever	*	good	+2 (at least)
25	Rottweiler	moderate dysplasia	mild dysplasia	+1
26	Standard Schnauzer	mild dysplasia	good	+3
28	Bernese Mountain Dog	*	fair	+1 (at least)
29	Golden Retriever	mild dysplasia	fair	+2
31	Golden Retriever	mild dysplasia	fair	+2
32	Golden Retriever	moderate dysplasia	good	+4
34	Golden Retriever	moderate dysplasia	mild dysplasia	+1
35	Golden Retriever	borderline	good	+2
37	Golden Retriever	borderline	good	+2
39	English Springer Spaniel	mild dysplasia	excellent	+4
40	Golden Retriever	*	fair	+1 (at least)
43	Bullmastiff	mild dysplasia	fair	+2
44	Golden Retriever	mild dysplasia	good	+3
46	Golden Retriever	mild dysplasia	good	+3
49	Afghan Hound	mild dysplasia	fair	+2
50	Rottweiler	mild dysplasia	fair	+2
52	Labrador Retriever	mild dysplasia	good	+3
53	German Shepherd	mild dysplasia	fair	+2

* #24, #28, #40- previous grade not reported. An assumption of borderline or lower grade
   is made because subluxation was reported.

** #14, #16, #23- failing grade not reported, the assumption is that a grade of borderline or lower
   was received

Table 5– Analysis of Grades Changed Upon Resubmission by this Hospital

Grades Changed	Number	Percentage
Negative Change	0	0%
No Change	0	0%
+1 (at least)	7 of 27	25.93%
+2	11 of 27	40.74%
+3	7 of 27	25.93%
+4	2 of 27	7.4%

Figure 2– Initial film done elsewhere. Received an O.F.A. rating of mild dysplasia.

11

Figure 2a– Retake film done at my hospital. Received O.F.A. rating of good.

Figure 3– Initial film done elsewhere. Received O.F.A. grade of mild dysplasia.

**Figure 3a– Retake film done at my hospital.
Received O.F.A. grade of fair.**

accepted by the O.F.A. and given an official grade. The image was brought to me on CD by the owner who assured me this is the radiograph that was submitted for evaluation. Please note how the left obturator foramen is markedly larger than the right and the femurs are not parallel but abducted. The patellas are also so far lateral they can be seen lateral to the lateral condyles. The femoral heads also appear angular and shallow.

Compare this image then to Figure 2A which is of the same dog using my radiographic technique. You be the judge. Which film most closely follows the published O.F.A. guidelines?

Can this possibly be the same dog? Microchip identification verified the identity.

The radiograph done "elsewhere" graded O.F.A. mild hip dysplasia.

The film I did graded O.F.A. good.

Next look at Figures 3 and 3A. This film is also of a Golden Retriever and was again brought to me on CD by the owner who assured me it was the film submitted to the O.F.A. The dog has a severely tilted pelvis. It displays asymmetry and malpositioning of the obturator foramen and the wings of the ileum. The left patella is correctly on the mid-line of the femur but the right patella is lateral to the mid-line. The femurs are not parallel and the left femoral head is deeper than the right.

Again verified by microchip, Figure 3A is my radiograph taken of the same dog seen in Figure 3. Can this possibly be the same dog?

Interestingly, both films were accepted and read by the O.F.A. The original radiograph was graded O.F.A. mild hip dysplasia. My resubmission film graded O.F.A. fair.

For a recent review of the correct hip extended VD pelvis radiographic technique see "Tips and Techniques for Pelvic Radiography" by Laura Armbrust, DVM in the July, 2009 issue of *Clinician's Brief*[2].

Discussion O

This paper is based on a retrospective client-based survey rather than an analysis of O.F.A. official records. Also, only 53 of 105 (50.47%) possible cases were reported back to me.

I believe the available data from my survey indicates the need for a much more intense survey of the situation with respect to variation of official O.F.A. scores (specifically when the only comment on

15

failing dogs is subluxation-unilateral or bilateral.).

The full survey questionnaire (Table 1) is presented for your review. Also, the full data collected from the survey is presented so no mystery is created on the part of the reader. The full report of potential and actual responses is in Table 1a and all data collected is in Table 2.

For this paper, I chose to review only the patients that had previous subluxation only failing O.F.A. grades (based on the original radiograph which was accepted and read by the O.F.A.) I then compared the official O.F.A. score which was received when I resubmitted a radiograph of the same patient (all verified by microchip or tattoo.) See Tables 3, 4 and 5.

As you can see, there is wide variation in official O.F.A. grade in the same patient.

The real question to be answered here is this: If the "GOLD STANDARD" of a test is "REPRODUCIBILITY," then how do we explain the major discrepancy in results reported by the O.F.A. on the same patient?

Recently, two O.F.A. resubmission clients brought me CDs with a copy of the original radiograph that was submitted, accepted and read by the O.F.A. I have provided the images of the original radiograph as well as the radiograph taken, submitted, accepted and read by the O.F.A. when done at my hospital.

Please review closely the radiographic images in Figures 2, 2a, 3 and 3a. Then compare those images to the recommended VD pelvis hip extended view as presented on the O.F.A. submission form[1]. (Figure 1). Observe and compare the previous images and resubmission images. Is there symmetry of the obturator foramen? Are the femurs parallel?

Finally, I have addressed the issue of anesthesia/sedation versus physical restraint only in a companion paper using the data collected in this survey.

Summary

In this group study of dogs that failed on official O.F.A. score when previously submitted and the comment reported was subluxation-either bilateral or unilateral, 92.59% (25/27) passed when I resubmitted the dog's new radiograph. A full 100% (27/27) went up at least one grade.

Conclusions:

1) My positioning technique passes dogs that should fail O.F.A.

2) Other's positioning technique fails dogs that should pass O.F.A.

3) A quality control issue exists at O.F.A.

4) Some combination of the above.

Endnotes

[a]Dexdomitor®, Pfizer Animal Health, New York, N.Y. .

References

[1]The Orthopedic Foundation for Animals, Hip and Elbow Dysplasia Application, online reference www.offa.org.

[2]Armbrust, Laura. Tips and Techniques for Pelvic Radiography. *Clinician's Brief* 2009 July; 7(7): 51-54.