Hip dyplasia in dogs : correlation between clinical lameness score, radiographic findings and walkway gait analysis

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INTRODUCTION

Hip dysplasia is a degenerative disease, leading to hip osteoarthritis and functional disabilities. It presents a high prevalence in canine populations during orthopaedic examinations in veterinary practices. Its diagnosis requires a combination of orthopaedics and radiographic findings. Despite the close relationship between X-Ray and hip dysplasia diagnosis, previous studies showed that the clinical examination was not correlated with radiographic hip dysplasia assessment. Moreover, objective gait analysis data obtained from kinetic and kinematic devices seemed not to be significantly correlated with radiographic lesions. A pressure walkway system has never been used to qualify and quantify this affliction.

OBJECTIVES

The aim of this study was to provide objective gait analysis and to look for correlation between lameness score, FCI grading and gait data.

MATERIALS AND METHOD

This retrospective study was based on clinical examination, diagnostic imaging and gait analysis of 18 dogs suffering from hip dysplasia. Gait analysis was performed with a GAITRite® pressure walkway system (**Figure 1**), which allowed for simultaneous four limbs assessment on consecutive strides. Surface and pressure of each paw's stance were collected, and symmetry between hind limbs was estimated for both parameters. If one hind limb supported 40% of the stance and the other limb 60%, asymmetry was estimated as the difference between both hind limbs, so 20%(*). Conventional positioning X-rays were interpreted by official panelists using FCI score (**Figure 2**). Presence and severity of osteoarthritis; light, moderate or severe; was also determined (**Figure 3**). Lameness was scored in light, moderate and severe, based on orthopaedic examination reports. Non-parametric Spearman rank test was used to assess correlation between clinical, radiographic and gait findings.

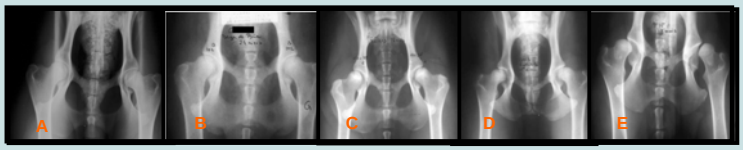

Figure 2 : X-rays showing the different stages of the FCI score

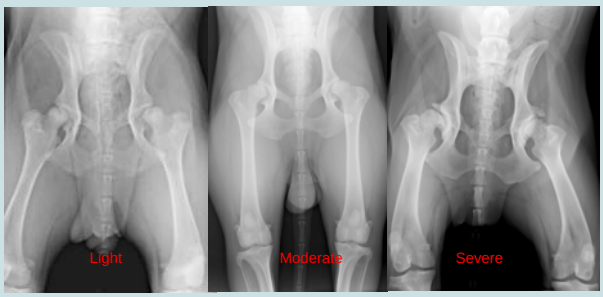

Figure 3 : X-rays showing the different stages of the OA score

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RESULTS

Lame dogs were highly different in shape, weight and age, but all of them presented an asymmetrical gait. Gait analysis showed an asymmetric stance distribution in pressure and surface. All grades of lameness, FCI score and osteoarthritis were represented. A significant correlation ($0.01<p<0.05$) was found between clinical lameness score and limb function disability assessed by pressure walkway system. Hind limb asymmetry increased significantly with the severity of the lameness (**Table 1 and Figures 4-5-6**). Results showed no significant correlation between hip dysplasia grading and gait analysis, neither between osteoarthritis score and gait analysis (**Table 1**).

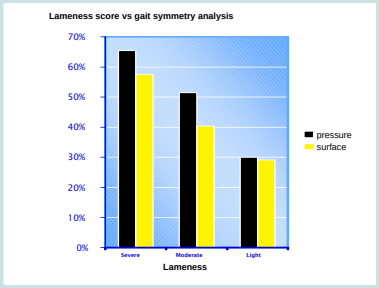
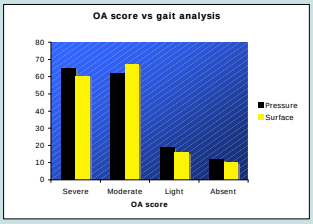


Figure 1 : GAITFour® system in use



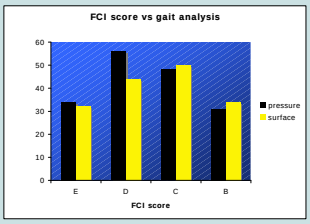


Figure 4 - 5 - 6 : Gait analysis vs lameness score / OA score / FCI score

		Asymmetry*	
		surface	pressure
OA score	Severe	65,44%	60,31%
	Moderate	62,80%	67,31%
	Light	19,18%	16,00%
	Absent	12,80%	10,30%
Lamenes score**	Severe	57,56%	65,44%
	Moderate	40,44%	51,44%
	Light	29,08%	29,92%
FCI score	E	34,89%	32,78%
	D	56,87%	44,40%
	C	48,06%	50,13%
	B	31,83%	34,25%

Table 1 : variation of the gait asymmetry regarding the different scores

DISCUSSION and CONCLUSION

In this study, the asymmetry of the gait was significantly correlated with the intensity of the observed lameness. With severe lameness, the weight report on the sound hind limb was more important than with light or moderate lameness, and its stance was heavier and broader than the lame one. Conversely, gait data was not correlated with radiographic findings, as it has been reported in the bibliography for the other gait analysis systems. The GAITRite® walkway system was found to be a sensitive and reliable way to functionally assess single limb lameness and it permitted the study of gait symmetry for all limbs. Diagnostic imaging and clinical examination are still considered the cornerstone of diagnostic testing. However, gait analysis of quadrupeds with a walkway system could be utilized for the long-term follow up of hip dysplasia and other functional disabilities.