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Interrater reliability of the grading of synovial intervertebral articulation osteoarthrosis in rider-sound horses

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1. Introduction

- Radiography (RX) and ultrasonography (US) evaluation of equine spine is challenging, and there is inconsistency in interpretation

- Purpose: determine interrater agreements for articular process synovial intervertebral articulation (SIVA) osteoarthrosis (OA)
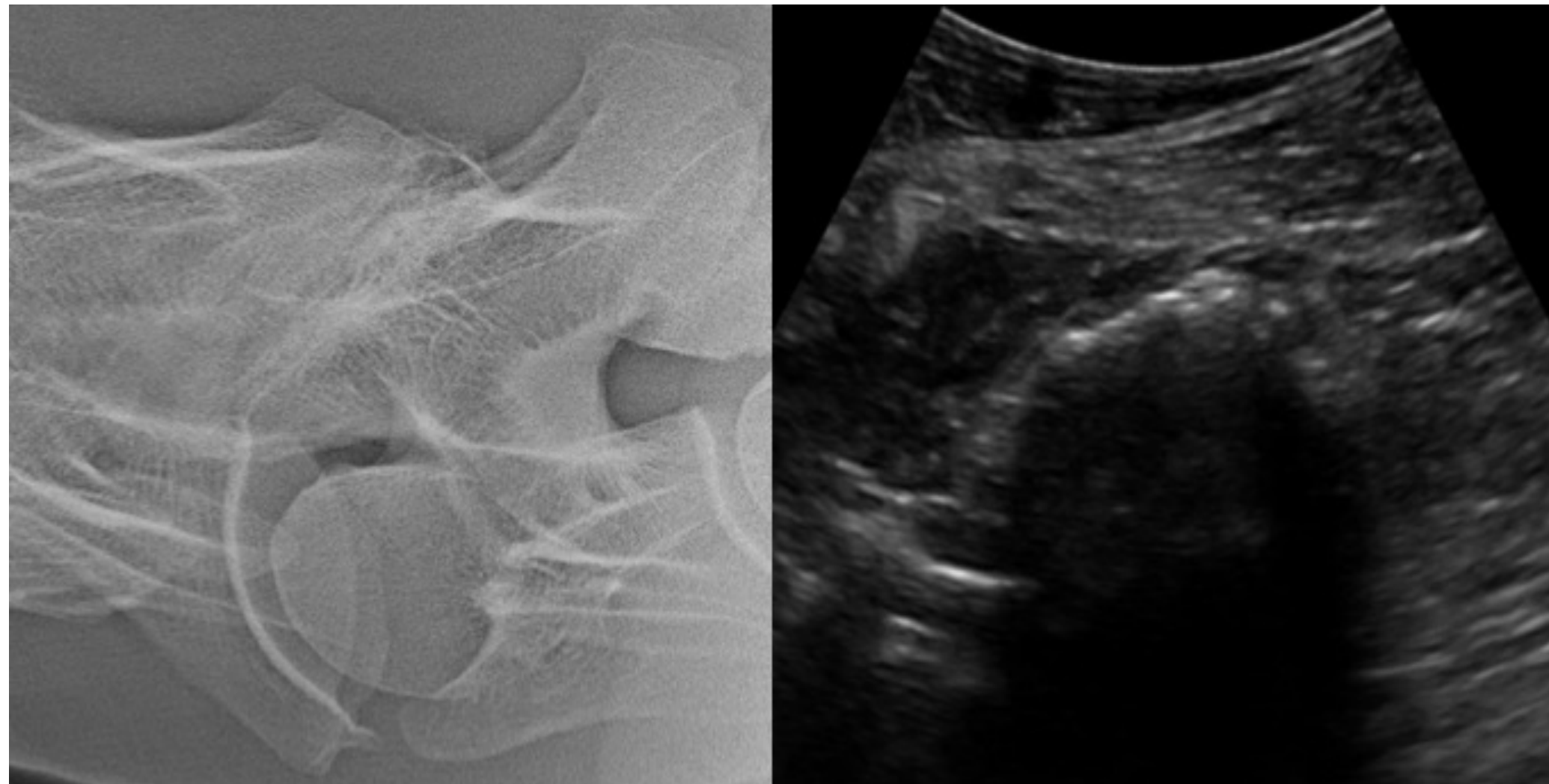
2. Methods

- 71 horses
- RX and US of SIVAs
- Subjective scoring system (grades 0 to 3)
- Independent interpretation by two experienced radiologists (JMD, JS)
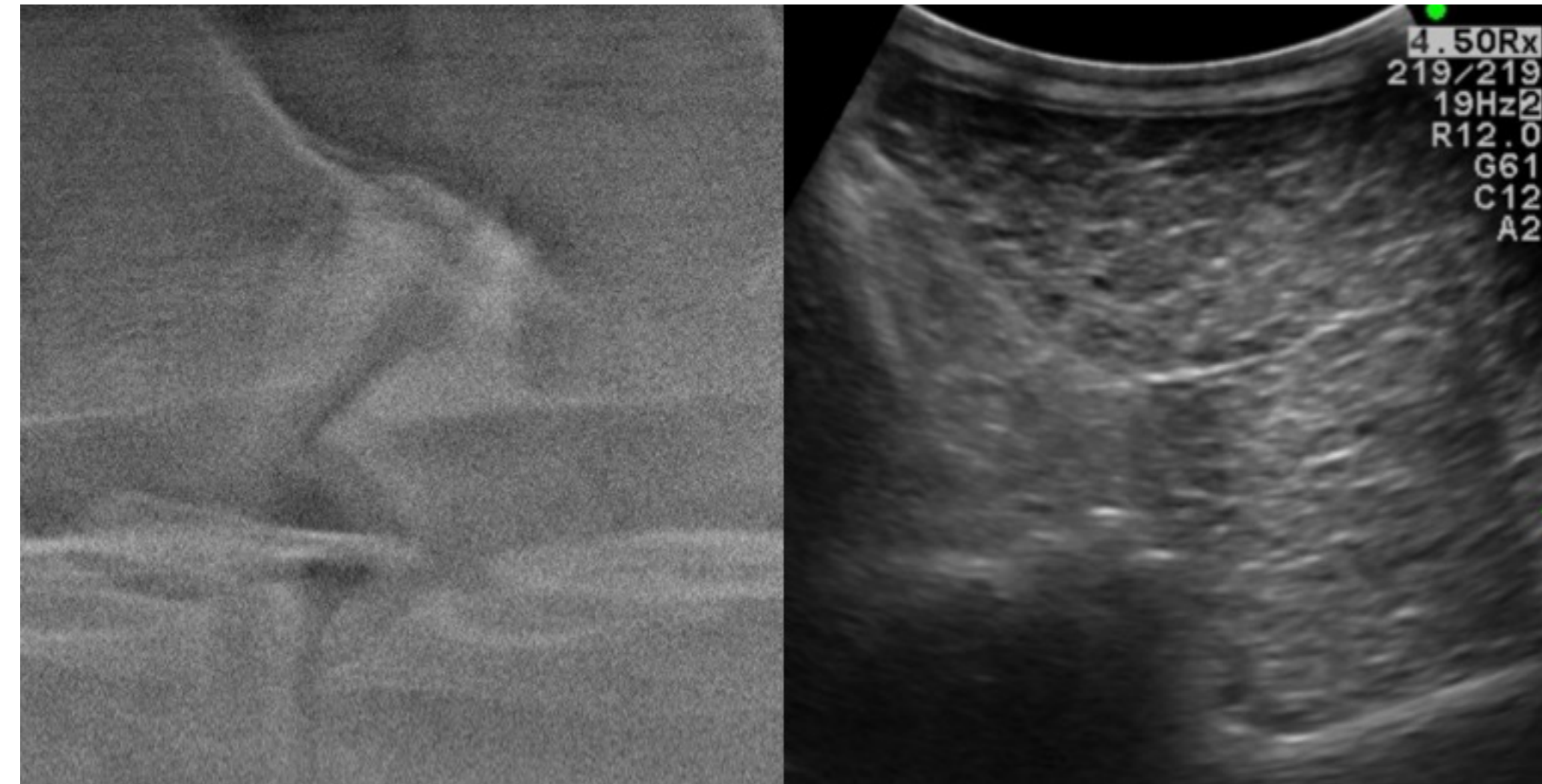- Cohen's Kappa calculated at each location

Fig.1: C6-C7 SIVAs, laterolateral RX and transverse US showing unequivocal grade 3 changes. There was perfect agreement on this case.

Fig.2: L1-L2 SIVAs, laterolateral RX and transverse US showing enlargement and remodelling. There was disagreement by two grades in this cases.

3. Results

Cervical SIVA OA:

➤ Moderate to high agreement for US (0.68-1)

➤ Weak to moderate for RX (0.53-0.83)

Thoracolumbar SIVA OA:

➤ Weak to moderate for both RX and US (0.32-0.75 and 0.32-0.71, respectively)

Cervical SIVA RX	Cirale			
C5-Th1	0	1	2	3
Zurich 0	115	3	1	0
Zurich 1	12	17	2	0
Zurich 2	7	6	18	2
Zurich 3	1	1	2	7

cases of agreement:	157
cases of disagreement by 1 grade:	27
cases of disagreement by 2 grades:	9
cases of disagreement by 3 grades:	1
K=	0.53 - 0.83

Cervical SIVA US	Cirale			
C5-Th1	0	1	2	3
Zurich 0	218	23	6	0
Zurich 1	50	43	9	0
Zurich 2	1	4	22	2
Zurich 3	0	0	0	1

cases of agreement:	284
cases of disagreement by 1 grade:	88
cases of disagreement by 2 grades:	7
cases of disagreement by 3 grades:	0
K=	0.68-1

Thoracolumbar SIVA RX	Cirale			
Th12-L4	0	1	2	3
Zurich 0	614	31	11	1
Zurich 1	31	16	2	2
Zurich 2	16	5	33	8
Zurich 3	0	0	5	5

cases of agreement:	669
cases of disagreement by 1 grade:	82
cases of disagreement by 2 grades:	29
cases of disagreement by 3 grades:	1
K=	0.32-0.75

Thoracolumbar SIVA US	Cirale			
Th18-L4	0	1	2	3
Zurich 0	353	13	1	0
Zurich 1	92	30	5	0
Zurich 2	12	13	19	0
Zurich 3	1	0	7	2

cases of agreement:	404
cases of disagreement by 1 grade:	130
cases of disagreement by 2 grades:	13
cases of disagreement by 3 grades:	1
K=	0.32-0.71

4. Discussion

- First report on reliabilities for grading of SIVA OA in large population of sound horses by experienced radiologists
- Reliability depends on region, besides other factors
- Better agreement in cervical than thoracolumbar region
- Likely explanation is superior quality of images due to less thickness of surrounding tissues resulting in less superimposition and depth
- Confounding factors:
  ➤ Subjective scoring system
  ➤ Asymptomatic character of population
  ➤ Degenerative nature of the pathology

Conclusions

- Better agreement in the cervical segment than the thoracolumbar

- US better agreement than RX in the cervical segment

- RX better agreement than US in the thoracolumbar segment

- Major role of subjective interpretation

- Correlation with clinical presentation of paramount importance

Contact

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Interrater reliability of SIVA OA grading at single locations (kappa values)

Location	RX	US Left	US Right
C5-C6	0.53	0.95	1
C6-C7	0.61	0.81	0.87
C7-Th1	0.83	0.83	0.68
Th12-Th13			
Th13-Th14	0.49		
Th14-Th15	0.32		
Th15-Th16	0.41		
Th16-Th17	0.5		
Th17-Th18	0.66		
Th18-L1	0.67	0.58	0.32
L1-L2	0.5	0.65	0.45
L2-L3	0.75	0.42	0.57
L3-L4	0.68	0.51	0.71

■ Radiography ■ Ultrasonography