

Evaluation of two novel ratio-based metrics for lumbar spinal stenosis

Supplemental Data

Levels (n=1046)	L1/L2 (n=224)	L2/L3 (n=234)	L3/L4 (n=230)	L4/L5 (n=209)	L5/S1 (n=149)
Normal (n=517)	166	113	75	70	93
Mild (n=349)	49	80	87	83	50
Moderate (n=82)	8	21	33	19	1
Severe (n=98)	1	20	35	37	5

Supplemental Table 1: Distribution of grades over the patient cohort (n=260): number of slices that were graded as normal, mild, moderate, or severe for each spinal level.

Gender Splits: Male vs Female					
	Female		Male		Significance
Metric	AUROC	95% CI	AUROC	95% CI	p-value
DSCA	88.5	[84.7, 92.4]	92.0	[89.3, 94.8]	p < 0.001
DSDIA	92.5	[89.9, 95.2]	93.2	[90.9, 95.5]	p < 0.001
DDRDIA	93.6	[90.5, 96.7]	96.8	[95.3, 98.2]	p < 0.001
DDRCA	91.3	[87.6, 95.0]	95.4	[93.2, 97.7]	p < 0.001
Age Splits: Age < 45 years vs Age ≥ 45 years					
	Age < 45 years		Age ≥ 45 years		Significance
Metric	AUROC	95% CI	AUROC	95% CI	p-value
DSCA	87.3	[80.8, 94.0]	91.0	[88.6, 93.5]	p < 0.001
DSDIA	96.5	[93.5, 99.2]	92.8	[90.8, 94.7]	p < 0.001
DDRDIA	97.4	[95.1, 99.8]	95.1	[93.5, 96.8]	p < 0.001
DDRCA	89.8	[82.5, 97.1]	93.5	[91.6, 95.5]	p < 0.001
BMI Splits: BMI < 25.0 kg/m ² vs BMI ≥ 25.0 kg/m ²					
	BMI < 25.0 kg/m ²		BMI ≥ 25.0 kg/m ²		Significance
Metric	AUROC	95% CI	AUROC	95% CI	p-value
DSCA	88.6	[85.5, 91.8]	90.8	[87.4, 94.1]	p < 0.001
DSDIA	90.7	[88.9, 92.4]	91.5	[89.7, 93.2]	p < 0.001
DDRDIA	95.3	[93.0, 97.5]	95.3	[93.3, 97.2]	p = 0.9
DDRCA	92.6	[89.3, 95.9]	94.5	[92.4, 96.7]	p < 0.001

Supplemental Table 2: AUROC for binary classification (normal vs stenosed) based on each metric across demographic splits in gender, age, and BMI. Metrics with the no significant difference (represented by the p-values) in AUROC between demographic splits are highlighted in bold.

Metric for each grade across anatomical splits based on the spinal level						
		L1/L2, L2/L3, L3/L4		L4/L5, L5/S1		Significance
Metric	Grade	Mean	Std Dev	Mean	Std Dev	p-value
DSCA	Normal	222.16	42.54	214.22	79.66	p = 0.03
	Mild	162.35	39.03	146.95	45.44	p < 0.001
	Moderate	106.74	28.67	94.09	30.84	p < 0.007
	Severe	68.94	18.09	53.89	24.69	p < 0.001
DSDIA	Normal	15.03	1.75	15.14	3.14	p = 0.17
	Mild	12.10	1.85	11.73	2.03	p = 0.04
	Moderate	9.26	1.64	8.84	1.59	p = 0.38
	Severe	6.95	1.51	6.43	1.88	p = 0.01
DDRDIA	Normal	0.42	0.07	0.41	0.09	p = 0.04
	Mild	0.29	0.06	0.29	0.05	p = 0.76
	Moderate	0.21	0.04	0.20	0.05	p = 0.82
	Severe	0.15	0.03	0.15	0.04	p = 0.66
DDRCA	Normal	0.38	0.05	0.37	0.08	p = 0.01
	Mild	0.28	0.04	0.28	0.05	p = 0.91
	Moderate	0.22	0.03	0.21	0.04	p = 0.54
	Severe	0.17	0.03	0.16	0.04	p = 0.09

Supplemental Table 3: Mean and standard deviation of the quantitative metric for each grade of stenosis (normal, mild, moderate, severe) across spinal level splits consisting of the upper lumbar levels (L1/L2, L2/L3, L3/L4) vs lower lumbar levels (L4/L5, L5/S1). The p-values represent a comparison of metric levels between spinal level groupings for each grade of stenosis.

Metrics Compared	AUROC: Group 1	AUROC: Group 2	Z-statistic	Significance
DSCA vs DSDIA	88.9 [86.4, 91.1]	92.5 [90.4, 94.3]	5.8	p < 0.0001
DSCA vs DDRDIA	88.9 [86.4, 91.1]	96.1 [94.4, 97.3]	6.97	p < 0.0001
DSCA vs DDRCA	88.9 [86.4, 91.1]	94.4 [92.5, 95.9]	5.97	p < 0.0001
DSDIA vs DDRDIA	92.5 [90.4, 94.3]	96.1 [94.4, 97.3]	4.93	p < 0.0001
DSDIA vs DDRCA	92.5 [90.4, 94.3]	94.4 [92.5, 95.9]	2.28	p = 0.02
DDRDIA vs DDRCA	96.1 [94.4, 97.3]	94.4 [92.5, 95.9]	3.70	p = 0.0002

Supplemental Table 4: Classification of each spinal level as normal vs mild/moderate/stenosed on the evaluation cohort (n=130) using each quantitative metric. Reported are pairwise comparisons between the quantitative metrics using DeLong's paired test for AUROCs.