

Spondylolisthesis Evaluation between Erect X-Ray and Supine MRI: The Exact Difference

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Introduction

Degenerative Spondylolisthesis (DS) refers to the anatomic defect in the vertebral pars interarticularis which leads to displacement of one vertebral body over the adjacent one. While standing and flexion extension x-rays are preferred for evaluating instability, a supine MRI is performed to identify signal changes in the cord and to identify additional pathologies. In the present study, we have presented a quantitative comparison of Meyerding grading of spondylolisthesis between lateral standing X-rays and supine MRI.

Methods

We retrospectively queried all patients diagnosed with spondylolisthesis in 2016. Only those cases were selected which had preoperative X-ray and MRI available for review. Primary variable of interest was the degree of slippage as per the Meyerding method, measured independently by 2 reviewers on lateral X-ray and sagittal MRI cuts. Agreement between the two reviewers was assessed using the two-way intraclass correlation coefficient (ICC). Agreement of Meyerding grade between the two imaging techniques was assessed using Cohen's Kappa while the slip percentage measured for each technique was compared using a Bland-Altman (BA) plot, mean difference (MD) and one-way ICC.

Table 1. Baseline demographics and surgical data summary of the enrolled cases Demographics Race n(%)			
		White	237(92.9)
		Black or African American	3(1.18)
Other	11(4.31)		
Unknown	4(1.57)		
Ethnicity n(%)			
Not Hispanic or Latino	244(95.7)		
Hispanic or Latino	2(0.01)		
Unknown	6(2.35)		
Female Sex, n(%)	120(47.1)		
Age at the time of surgery			
Mean(SD)	65.1(13.2)		
Median(IQR)	68(58-74)		
Surgical Data Sum	mary		
Procedure Type, n(%)			
Decompression	113(44.0)		
Arthrodesis	142(56.0)		
Lumber Levels, n(%)			
L2	22(8.63)		
L3	43(16.9)		
L4	141(55.3)		
L5	49(19.2)		
Olisthesis Direction, n(%)			
Anterolisthesis	207(81.2)		
Retrolisthesis	48(18.9)		

Results

After applying exclusion criteria to 1069 cases of spondylolisthesis identified in 2016, a total of 273 cases were considered eligible for analysis. ICC between the two reviewers was found to be 0.75 (95%CI=0.64-0.83, p<0.001) for X-ray and 0.76 (95%CI=0.66-0.83, p<0.001) for MRI showing good agreement. Agreement between X-ray and MRI for grading of spondylolisthesis was found to be poor (Kappa= 0.32, p<0.001). BA plot between X-ray and MRI measurements revealed a MD of 4.3% (95% limits of agreement=-1.03-18.9) with 5.56% observations outside the limits of agreement and one-way ICC of 0.35 showing poor agreement.

Conclusions

Our results demonstrate the discrepancy of spondylolisthesis grade measurements between X -ray and MRI. Careful evaluation of both imaging technique is warranted to determine the final severity of pathology and tailoring of management plan.

