

In patients with lumbar stenosis: Are we able to predict limitations in activities of daily living and participation using morphological markers, depression and age as predictors?

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INTRODUCTION

Demographic changes in the last decades led to an increase in the number of elderly people going along with an increase in the prevalence of degenerative disc diseases. Degenerative lumbar stenosis results from facet joint degenerations, osteophyte formations and ligamentum flavum hypertrophies and is associated with a lot of discomfort and limitations in activities of daily living (ADL) (1). Hence, symptomatic lumbar stenosis is one of the most frequent indications for spinal surgery (2). The most promising imaging test is magnetic resonance imaging (3). However, it remains unclear to what extent there is a direct relationship between the severity of lumbar stenosis and pain or limitations. Particularly elderly people (60 – 80 a) show a lot of abnormal MRI findings in totally asymptomatic subjects; up to 1/5 have lumbar spinal stenosis (4). Also the influence of psychological factors and age has not been finally clarified. The aim of this study was to investigate whether morphological markers, depression as well as age can predict pain intensity, the execution of ADL and fear of movements in patients suffering from lumbar stenosis.

References
 1. Abbas J, Slon V, Stein D, Peled N, Hershkovitz I, Hamoud K. In the quest for degenerative lumbar spinal stenosis etiology: the Schmorl's nodes model. BMC Musculoskelet Disord. 2017 Apr 20;18(1):164.
 2. Deyo RA. Treatment of lumbar spinal stenosis: a balancing act. Spine J 2010;10:625–7.
 3. De Schepper EL, Overvest GM, Suri P, Peul WC, Oei EH, Koes BW, Bierma-Zeinstra SM, Luijsterburg PA. Diagnosis of lumbar spinal stenosis: an updated systematic review of the accuracy of diagnostic tests. Spine (Phila Pa 1976) 2013 Apr 15; 38 (8): E 469-81.
 4. Boden SD, Davis DO, Dina TS, et al. Abnormal magnetic-resonance scans of the lumbar spine in asymptomatic subjects. A prospective investigation. J Bone Joint Surg Am 1990;72:403–8.

METHODS

Sixty-seven patients (tab. 1) with lumbar spine stenosis (mean age of 62.5 [11.7], 50.7% females) participated in the study. Linear regression analyses were used to predict self-reported pain intensity (VAS), interference of pain with the performance of ADL (PI-G), ADL (RehaCAT), participation in social life (AAPI) and fear of movement (TSK_GV). As predictors age, self-reported depression (DESC) and morphological markers were used. The severity of the lumbar stenosis was indexed with MRI evaluation using the Schizas classification. Furthermore the number of affected segments and the presence of spondylolisthesis was included in the evaluation.

67 patients with lumbar stenosis

Characteristic	Unit	Value
gender	(% ♀, % ♂)	49.3% / 50.7%
age	M (SD)	62.5 (11.7)
depression [DESC]	M (SD)	10.9 (8.6)
DESC ≥ 12	(%)	41.5%
spondylolisthesis	(%)	35.8%
Number of affected segments	(%)	
1		28.4%
2		41.8%
3		19.4%
4		10.4%
Schizas-classification	(%)	
B (moderate)		32.8%
C (severe)		35.8%
D (extreme)		31.3%

Table 1: Sample description

RESULTS

The results of the linear regression analyses revealed that all dependent variables are significantly predicted by depression, age and the morphological markers. A significant proportion of variance is explained with R² ranging between 12.4 (PI-G-physical) and 53.8 (VAS). It was additionally investigated which of the predictors significantly contributed to the explained variance using the stepwise-method. Depression is the most powerful predictor for all dependent variables and at the same time the unique predictor for most of them. Exceptions are pain intensity which was in addition significantly predicted by age and the number of affected segments, as well as fear of movement and ADL requiring lower extremity function which were both also predicted by the severity of the lumbar stenosis.



Fig. 1: Patient with a spinal stenosis L4/5 (Schizas grade C)

CONCLUSION

A high depression score, probably indicating deficient adaptation and coping regarding the disease and its consequences, is the most important predictor for limitations in ADL and participation. The morphological markers severity of spinal stenosis and number of affected segments contributed significantly to predict self-reported pain intensity, activity avoidance and ADLs requiring lower extremity function. In our study a total of 41.5% of the patients had a clinically noticeable depression score. Furthermore, with depression being the most powerful predictor for all dependent variables, early monitoring and treatment of depression is recommended. This may help to avoid operations or to positively influence the operative outcome.

Predicted clinical outcomes	Assessed construct	Score-range (b) - (c)	M (SD)	Linear Regression						step-wise-Regression: predictors ordered according to regression weights		
				R ²	β _{DESC}	β _{Age}	β _{Spond.}	β _{SKS_Seg.}	β _{SKS_Schizas}	1.	2.	3.
VAS	pain	0 – 100	62.5 (27.7)	.54*	.53*	-.49*	-.04	.38*	.03	DESC	age	SKS _{Seg.}
PI-G	Pain interference:											
PI-G_mental	Mental	0 – 52	26.6 (10.2)	.34*	.56*	.04	.10	-.07	-.16	DESC		
PI-G_functional	ADL	0 – 44	30.4 (11.1)	.26*	.45*	-.04	-.11	-.16	.01	DESC		
PI-G_physical	Mobility	0 – 16	10.9 (4)	.14	.34*	-.09	-.12	.02	.01	DESC		
RehaCAT	ADL:											
RehaCAT_LE	Lower extremity function	0 – 128	58.2 (29.8)	.27*	.39*	.05	-.10	-.09	.25	DESC	SKS _{Schizas}	
RehaCAT_UE	Upper extremity function	0 – 148	26.5 (29.2)	.20*	.38*	.11	.04	-.06	.16	DESC		
RehaCAT_ADL	ADL (UE & LE)	0 – 124	69 (27.6)	.30*	.44*	.03	-.26	-.23	.08	DESC		
AAPI_P	Participation	60 – 0	44 (12.2)	.36*	-.51*	.15	.10	.13	-.12	DESC		
TSK	Fear of movement:											
TSK_SF	Somatic focus	5 – 20	10.5 (3.3)	.20*	.38*	.11	-.07	-.17	.08	DESC		
TSK_AA	Activity avoidance	6 – 24	14.4 (4.1)	.19*	.31*	.09	-.11	-.04	.19	DESC	SKS _{Schizas}	

VAS: Visual Analogue Scale; PI-G: Pain Interference – German; AAPI_P: Aachen Activity- and Participation Index, sub-scale participation; TSK: Tampa Scale for Kinesiophobia; SF: somatic focus; AA: activity avoidance; ADL: activities of daily living; DESC: Rasch-based depression screening; Spond.: Spondylolisthesis; SKS_Seg.: number of affected segments; SKS_Schizas: Schizas-classification

Disclosure declaration:
 None of the authors has any potential conflict of interest.