ADVERSE EVENT DEVELOPMENT IN LUMBAR STENOSIS SURGICAL MANAGEMENT:

A POPULATION-BASED STUDY OF ASSOCIATED FACTORS

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BACKGROUND

We carried out a retrospective population-based study.

It was concluded that a multi-level decompression, hospital stay beyond 5 days, symptom onset of more than 6 months prior to surgery, and Body-Mass Index 5 units above normal limit, are factors associated with the development of surgical and medical adverse events in Lumbar Stenosis surgery.

PURPOSE

Given the high rate of post-operative adverse events following Lumbar Stenosis surgery, and the lack of consensus upon the most adequate treatment option for these patients, it becomes of the utmost importance to identify the risk factors associated with the development of adverse events.

Our study explored variations in the risk of adverse events in a sample of patients intervened at a reference hospital, according to demographic factors, risk factors related to clinical presentation before surgery, and factors related to the surgical procedure.

MATERIALS AND METHODS

A total of 429 Lumbar Stenosis surgery cases were included in the analysis.

These were patients who had undergone surgery between 2003 and 2013, and who had been followed up for a minimum of 12 months posterior to surgery.

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The main outcome measure was the presence of adverse events, divided into medical and surgical, versus no adverse event presence.

Independent variables included multiple demographic, clinical, and surgical variables.

MATERIALS AND METHODS

We analysed secondary data obtained from a database of spinal surgeries performed at a single reference clinical centre, using:

Ji^2 tests for qualitative variables with an expected number of observations above 5 in every cell of the cross-classification tables, and Fisher exact tests for values below.

Parametric Student t or non-parametric Mann-Whitney U tests for the quantitative variables, depending on whether they were normally distributed or not.

This was followed by a multivariate analysis using a logistic regression model including those variables found to be statistically significant in the bi-variate analysis ($p< 0.25$).

RESULTS- PRESENTING VARIABLES

VARIABLE	NUMBER OF PATIENTS (%)
PRESENTING SYMPTOMS	
Lumbar Pain	113 (26.3)
Radiculopathy	48 (11.2)
Neurogenic Claudication	8 (1.9)
Mixed	241 (56.2)
Time from Symptom Onset (Months)*	18.4 ± 28.9
PAIN INTENSITY (VAS)	
Mild (1-4)	4 (0.9)
Moderate (5-7)	34 (7.9)
Severe (8-10)	93 (21.7)
TYPE OF STENOSIS	
Lateral	152 (35.4)
Central	39 (9.1)
Mixed	99 (23.1)
STENOSIS LEVEL	
L1-L2	2 (0.5)
L2-L3	7 (1.6)
L3-L4	26 (6.1)
L4-L5	180 (42.0)
L5-S1	128 (29.8)
Multiple Levels	86 (20.0)
ASSOCIATED COMORBIDITY	
Arterial Hypertension	155 (36.1)
Dyslipidemia	85 (19.8)
Cigarette Use	63 (14.7)
Cardiopathy	31 (7.2)
Chronic Respiratory Disease	25 (5.8)
Corticosteroid Use	17 (4.0)
Anticoagulant Use	12 (2.8)
Renal Disease	9 (2.1)
Hematological Disease	8 (1.9)
Hepatic Disease	2 (0.5)

* Mean ± Standard Deviation; † Median [Interquartile Range].

RESULTS–SURGICAL MANAGEMENT RECEIVED

VARIABLE	NUMBER OF PATIENTS (%)
Hospital Stay (Days)*	4.7 ± 4.4
Surgical Duration (Minutes)*	266.6 ± 128.9
TYPE OF ANAESTHESIA PROVIDED	
General	421 (98.1)
Regional	3 (0.7)
Surgical Bleed (mL)*	278.9 ± 349.2
Red Blood Cell Transfusion (Units)†	1 [1-5]
TYPE OF SURGERY	
Decompression	242 (56.4)
Decompression + Arthrodesis + Instrumentation	157 (36.6)
Decompression + Arthrodesis	18 (4.2)
Arthrodesis + Instrumentation	4 (0.9)
Arthrodesis 360°	2 (0.5)
LEVEL INTERVENED	
L1-L2	1 (0.2)
L2-L3	5 (1.2)
L3-L4	31 (7.2)
L4-L5	179 (41.8)
L5-S1	132 (30.8)
Multilevel	80 (18.6)
Number of Screws Used†	4 [1-10]
GRAFT USE	
Autograft	111 (61.3)
Allograft	62 (33.8)

* Mean ± Standard Deviation; † Median [Minimum-Maximum].

SUMMARY OF MEDICAL AND SURGICAL ADVERSE EVENTS

MEDICAL ADVERSE EVENT	NUMBER OF PATIENTS (%)
Urinary Tract Infection	6 (1.4)
Acute Heart Failure	5 (1.2)
Respiratory Failure	3 (0.7)
Deep Vein Thrombosis	3 (0.7)
Sepsis	2 (0.5)
Pulmonary Thromboembolism	1 (0.2)
Myocardial Infarction	1 (0.2)
Pneumonia	1 (0.2)
Complete Spinal Cord Lesion	1 (0.2)

SURGICAL ADVERSE EVENT	NUMBER OF PATIENTS (%)
Dura mater Injury	42 (9.8)
Deep Wound Infection	7 (1.6)
Superficial Wound Infection	7 (1.6)
Vascular Injury	7 (1.6)
Instrumentation Failure	6 (1.4)
Fracture	4 (0.9)
Pseudo-arthrosis	3 (0.7)
Epidural Hematoma	1 (0.2)

INDEPENDENTLY ASSOCIATED FACTORS FOR ADVERSE EVENT DEVELOPMENT

VARIABLE	OR	95% C.I.	P
Body-Mass Index ≥ 30 kg/m^2	1.80	[1.01-1.25]	0.029
Time from Symptom Onset to Surgery > 6 months	1.08	[1.00-1.02]	0.047
Length of Hospital Stay > 5 days	1.67	[1.01-1.21]	0.023
Multiple Level Intervention	2.99	[1.23-7.29]	0.015
Surgical Blood Loss (< 50mL)	0.11	[0.01-0.91]	0.040

CONCLUSIONS

The factors found to be associated with the development of surgical and medical adverse events in Lumbar Stenosis surgery, are a multi-level intervention, hospital stay beyond 5 days, symptom onset of more than 6 months prior to surgery, and Body-Mass Index 5 units above normal limit.

Surgical instrumentation was not seen to be an associated factor, whilst intra-operative bleed below 50mL was a protective factor.

The main preventable medical adverse event is urinary tract infection, and the major surgical events are Dura mater lesion, surgical wound infection, and instrumentation failure.

DISCLOSURE DECLARATION

None of the authors has any potential conflict of interest