

Does Glycemic Control Explain the Risk of Infection in Diabetic Patients Undergoing Instrumented Lumbar Arthrodesis?

Jorge Nuñez (Terrassa, Espagne), Juan Diego Montenegro (Terrassa, Espagne), Berta Escudero (Terrassa, Espagne)

Introduction

Diabetes mellitus (DM) is an established risk factor for acute postoperative infection in spine surgery. However, uncertainty remains as to whether this risk is attributable to DM itself, the degree of glycemic control, or the presence of other metabolic factors. The aim of this study was to determine whether poor glycemic control could explain the increased risk of infection reported in the literature among diabetic patients undergoing lumbar arthrodesis

Materials and Methods

This retrospective observational study included all patients with DM who underwent lumbar arthrodesis for degenerative pathology at a tertiary care hospital between 2015 and 2024. The primary outcome was acute deep postoperative infection. Demographic, clinical, metabolic (preoperative and postoperative glucose levels, preoperative glycated hemoglobin [HbA1c]), and surgical variables were collected.

Results

Among 652 patients who underwent surgery for degenerative pathology, 97 patients with DM were identified. The incidence of acute infection was 10.3% (Table 1). Patients who developed infection showed higher HbA1c values ($7.64 \pm 1.72\%$), although this difference was not statistically significant ($p = 0.35$). Logistic regression analysis demonstrated only a non-significant trend toward increased risk with each 1% increase in HbA1c (OR: 1.57; $p = 0.14$). Neither HbA1c cut-off values ($\geq 7\%$ or $\geq 7.5\%$), nor preoperative or postoperative glucose levels, nor the type or treatment of DM were associated with infection (Table 2).

In contrast, infected patients had a higher body mass index (BMI) (32.1 ± 3.6 vs. 29.6 ± 3.6 kg/m²; $p = 0.059$), with a significant association in logistic regression (OR: 1.19 per kg/m²; $p = 0.048$), and a higher prevalence of obesity (BMI ≥ 30 kg/m²) (17.4% vs. 3.9%; OR: 5.16; $p = 0.043$) (Table 2).

Conclusion

In our series, obesity was the only factor significantly associated with acute postoperative infection in diabetic patients undergoing lumbar arthrodesis, whereas glycemic control showed only a non-conclusive trend. These findings suggest that excess body weight may play a more determinant role than isolated glycemic levels in this patient population. Nevertheless, we consider that preoperative glycemic optimization remains clinically relevant.

Table 1. General Characteristics of Diabetic Patients and Comparison Between Infected and Non-Infected Patients

Variable	Total Cohort (n=97)	No Infection (n=87)	Infection (n=10)	p
Age (years) - mean ± SD	67.7 ± 10.6	67.5 ± 10.8	69.1 ± 8.9	0.64
Female sex (%)	66%	64%	80%	0.47
BMI (kg/m²) - mean ± SD	29.9 ± 3.6	29.6 ± 3.6	32.1 ± 3.6	0.059
Obesity (BMI ≥ 30) (%)	47%	44%	80%	0.043
Type 2 DM (%)	95%	98%	100%	0.62
Insulin treatment (%)	71%	78%	50%	0.14
Oral antidiabetic drugs (%)	29%	26%	40%	0.29
Preoperative glucose (mg/dL) - mean ± SD	139 ± 41	138 ± 41	149 ± 44	0.59
Postoperative glucose (mg/dL) - mean ± SD	168 ± 52	165 ± 48	189 ± 65	0.21
HbA1c (%)	7.15 ± 1.12	7.07 ± 0.98	7.64 ± 1.72	0.35
Number of operated levels - mean ± SD	2.03 ± 1.06	2.05 ± 1.03	1.90 ± 1.29	0.68
Transfusion (%)	2%	2.3%	0%	0.79
Drain use (%)	24%	23%	30%	0.69

SD: standard deviation; BMI: body mass index; DM: diabetes mellitus; mg/dL: milligrams per deciliter

Table 2. Univariate Logistic Regression: Glycemic Control and Risk of Acute Postoperative Infection

Variable	OR	95% CI	p
HbA1c (per +1%)	1.57	0.87 - 2.86	0.14
HbA1c ≥ 7%	1.76	0.32 - 9.52	0.51
HbA1c ≥ 7.5%	2.60	0.69 - 9.73	0.16
Preoperative glucose (mg/dL)	1.01	0.98 - 1.03	0.59
Postoperative glucose (mg/dL)	1.01	0.99 - 1.03	0.21
Type 2 DM	—	—	0.62
Insulin treatment	0.33	0.08 - 1.40	0.14
Oral antidiabetic drugs	2.17	0.56 - 8.42	0.29
BMI (per +1 kg/m ²)	1.19	1.00 - 1.40	0.048
Obesity (BMI ≥ 30 kg/m ²)	5.16	1.13 - 23.5	0.043

OR = odds ratio; CI = confidence interval.

OR for Type 2 DM could not be estimated due to complete separation (all infections occurred in Type 2 DM patients).