Comparison of Perioperative Outcomes Following Open versus Minimally Invasive Transforaminal Lumbar Interbody Fusion in Obese Patients

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Introduction

Minimally invasive (MI) transforaminal lumbar interbody fusion (TLIF) has proven to be effective in the treatment of spondylolisthesis and degenerative disk disease (DDD). Compared to the traditional open TLIF, MI TLIF has been associated with less blood loss, less postoperative pain, and shorter length of hospital stay. However, it is uncertain whether the advantages from MI TLIF also benefit specifically obese patients. This study is dedicated to evaluating whether obese patients are able to reap perioperative benefits similar to those seen in patients with normal body mass index (BMI) when undergoing MI TLIF.

Methods

Obese (BMI of at least 30 kg/m2) patients who underwent single-level TLIF were identified (Figure). Patients were categorized according to BMI: class I obesity (BMI of 30.0-34.9 kg/m2), class II obesity (BMI of 35.0-39.9 kg/m2), or class III obesity (40.0 kg/m2 and greater). Among each obesity class, patients were stratified by TLIF approach: open vs. MI. Perioperative outcomes including intraoperative estimated blood loss (EBL), complications (total, intraoperative, and 30-day postoperative), and length of stay were compared. Chi-squared test, Fischer exact test, or 2-tailed Student t test were employed when appropriate.

Results

A total of 127 patients were included in the final analysis: 49 open and 78 MI. There were 61 patients with class I obesity (23 open and 38 MI), 45 with class II obesity (19 open and 26 MI), and 21 patients with class III obesity (7 open and 14 MI). Overall, mean EBL was 397.2 cc and mean length of stay was 3.7 days. MI TLIF was associated with significantly less EBL and shorter hospital stay than open TLIF when all patients were evaluated as a single cohort and within individual obesity class (Tables 1, 2). Overall, complication rate was 18.1%. MI TLIF was associated with a significantly lower total complication rate (11.5% MI vs. 28.6% open) and intraoperative complication rate (3.8% MI vs. 16.3% open) compared to open TLIF (Table 3). When stratified by obesity class, MI TLIF still was associated with lower rates of total and intraoperative complications. This effect was most profound and statistically significant in patients with class III obesity (42.9% open vs. 7.1% MI).

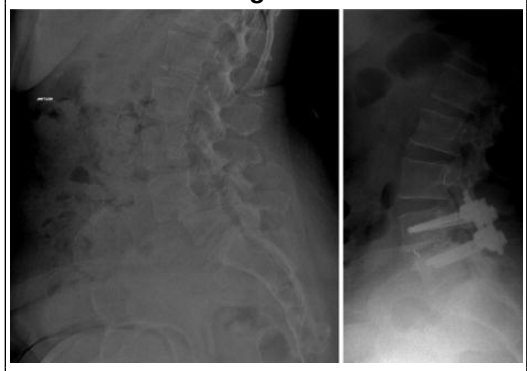
Conclusions

MI TLIF offers obese patients perioperative benefits similar to those seen in patients with normal BMI who undergo MI TLIF. These benefits include less EBL, shorter hospital stay, and potentially fewer complications compared to open TLIF. Additional large retrospective studies and randomized prospective studies are needed to verify these findings.

Learning Objectives

1. Obese patients undergoing MI TLIF had decreased EBL and LOS compared to open TLIF.
2. There were fewer complications with MI TLIF compared to open TLIF.

Figure



Obese patient who underwent MI TLIF for symptomatic spondylolisthesis.

Table 1

Group	Overall	Open TLIF	MI TLIF	p Value
overall	397.2 ± 494.6	661.0 ± 561.3	168.6 ± 16.2.1	<0.001
Class I obesity	443.2 ± 408.8	741.3 ± 453.7	141.7 ± 125.1	<0.001
Class II obesity	340.7 ± 356.6	596.8 ± 415.7	153.5 ± 114.2	<0.001
Class III obesity	384.5 ± 368.1	614.3 ± 449.7	269.6 ± 269.2	0.040

EBL for MI TLIF vs Open TLIF.

Table 2

Group	Overall	Open TLIF	MI TLIF	p Value
overall	3.7 ± 2.0	4.7 ± 2.1	3.1 ± 1.7	<0.001
Class I obesity	3.6 ± 2.0	4.2 ± 2.1	3.0 ± 2.0	0.004
Class II obesity	3.8 ± 1.9	4.7 ± 2.1	3.0 ± 1.4	0.002
Class III obesity	3.9 ± 1.9	4.6 ± 2.2	3.6 ± 1.6	0.345

Length of stay for MI TLIF vs Open TLIF.

Table 3

Group & Complication	Total	Open TLIF	MI TLIF	p Value
total				
no. of patients	127	49	78	
overall*	23 (18.1)	14 (28.6)	9 (11.5)	0.017
intraop	11 (8.7)	8 (16.3)	3 (3.8)	0.015
postop	14 (11.0)	6 (12.2)	8 (10.3)	0.729
Class I obesity				
no. of patients	61	23	38	
overall*	12 (19.7)	7 (30.4)	5 (13.2)	0.100
intraop	7 (11.5)	5 (21.7)	2 (5.3)	0.050
postop	6 (9.8)	2 (8.7)	4 (10.5)	0.816
Class II obesity				
no. of patients	45	19	26	
overall*	7 (15.6)	4 (21.1)	3 (11.5)	0.384
intraop	1 (2.2)	1 (5.3)	0 (0.0)	0.237
postop	6 (13.3)	3 (15.8)	3 (11.5)	0.679
Class III obesity				
no. of patients	21	7	14	
overall*	4 (19.0)	3 (42.9)	1 (7.1)	0.049
intraop	3 (14.3)	2 (28.6)	1 (7.1)	0.186
postop	2 (9.5)	1 (14.3)	1 (7.1)	0.599

Complications in MI TLIF vs Open TLIF.